CALABAZAS CREEK

PLANNING STUDY
(GUADALUPE SLOUGH TO MILLER AVENUE)

consisting of the combined
ENGINEER'S REPORT
and
FINAL ENVIRONMENTAL IMPACT REPORT

APRIL 1992
FINAL PRINTING: FEB. 1994
Santa Clara Valley Water District

With Assistance From:

Rocelia G. Kmak	Associate Civil Engineer
Walter L. Wadlow	Division Engineer
Steven K. Dunlap	Maintenance Planner
Michael Marangio	John Stanley & Associates (Habitat Restoration Group)
James Thompson	West Consultant, Inc.
Daniel Stephens	H. T. Harvey & Associates

Between Guadalupe Slough and Lawrence Expressway, the Environmental Impact Report issues concerning terrestrial biology were prepared by Susan Sanders, PAR & Associates, in association with Virginia Dains, Geobotanical Phenomenology.

Between Lawrence Expressway and Miller Avenue, the Environmental Impact Report issues sections, including the biological and Habitat Evaluation Procedures (HEP) analysis were prepared by Riparian Systems, under the direction of Anne Sands, in association with EIP Associates (Booker Holton, Project Manager); Susan Sanders and Virginia Dains, under contract to the Santa Clara Valley Water District.

TC-256 3S C3 1994 c. 6

SANTA CLARA VALLEY WATER DISTRICT

CALABAZAS CREEK PLANNING STUDY

Guadalupe Slough to Miller Avenue

Consisting of the Combined

ENGINEER'S REPORT

AND

FINAL ENVIRONMENTAL IMPACT REPORT

Project No. 2010

Engineer's Report Prepared by Flood Control Planning Division

Jeff Micko, P.E.	Associate Civil Engineer
Kenn Reiller, P.E.	Assistant Civil Engineer II
Maria Matthews	Engineering Technician
Randall R. Talley, P.E.	Division Engineer

Final Environmental Impact Report

Prepared under the Direction of

Dr. Bernard H. Goldner	Environmental Specialist
Cindy Roessler	Assistant Environmental Specialist

Stan N. Wolfe, P.E.
Head, Project Development Branch

Ronald R. Esau
General Manager

Kay Whitlock, P.E.
Flood Control Manager

APRIL 1992

DISTRICT BOARD OF DIRECTORS

Joe Pandit	**District 1**	**James J. Lenihan**	**District 5**
Patrick J. Ferraro, Chairman	**District 2**	**Sig Sanchez**	**At Large**
Robert W. Gross	**District 3**	**Joe Judge**	**At Large**
Joseph H. Donohue, Vice Chairman	**District 4**		

R7066tp

TABLE OF CONTENTS

Page

TABLE OF CONTENTS i

PREFACE 1

SUMMARY 3
- STUDY OVERVIEW 3
- DISTRICT PLANNING GOALS AND OBJECTIVES 3
- BACKGROUND 3
- PROBLEM DEFINITION 4
- ALTERNATIVE SOLUTIONS 4
- PROPOSED PROJECT 5
- ENVIRONMENTAL IMPACTS 6
  - Biological Impacts 6
    - Guadalupe Slough to Tasman Drive (Reaches 9-11) 6
    - Tasman Drive to Highway 101 (Reach 12) 6
    - Lawrence Expressway to Miller Avenue (Reaches 1-8) 6
  - Mitigation of Biological Impacts 7
    - Guadalupe Slough to Tasman Drive (Reaches 9-12) 7
    - Lawrence Expressway to Miller Avenue (Reaches 1-8) 7
  - Aesthetic Impacts 7
    - Guadalupe Slough to Lawrence Expressway (Reaches 9-26) 7
    - Lawrence Expressway to Miller Avenue (Reaches 1-8) 7
  - Mitigation of Aesthetic Impacts 8
    - Guadalupe Slough to Lawrence Expressway (Reaches 9-26) 8
    - Lawrence Expressway to Miller Avenue (Reaches 1-8) 8
  - Archeological Impacts 8
  - Mitigation of Archeological Impacts 8
- IMPACTS TO LOCAL DRAINAGE 8
- MITIGATION OF IMPACTS TO LOCAL DRAINAGE 8
- CONSTRUCTION-RELATED IMPACTS 9
- MITIGATION OF CONSTRUCTION-RELATED IMPACTS 9
- COMMUNITY INVOLVEMENT 9
- PROJECT COST, BENEFITS, AND FINANCING 10
- CONSTRUCTION STAGING 10

STUDY BACKGROUND 13
- THE CALABAZAS CREEK WATERSHED 13
- STUDY AREA 13
  - Previous Studies and Construction 13
  - Hydrogeologic Setting 17
  - Environmental Setting 17
    - Streamside Visual Quality 17
    - Streamside Biological Conditions 18
    - Special Status Species 21
    - Cultural Resources 22

Page

PROBLEM DEFINITION 23
  HISTORIC FLOODING PROBLEMS 23
  RECENT FLOODING 23
  POTENTIAL FLOOD PROBLEMS 23
    Description of the 1 Percent Flood 24
  SEDIMENT PROBLEMS 27
  EROSION PROBLEMS 29
  LAND SUBSIDENCE EFFECTS ON FLOOD CONTROL 29
  LOCAL DRAINAGE PROBLEMS 29
  MAINTENANCE CONCERNS 31

FORMULATION OF ALTERNATIVES 33
  ENGINEERING CRITERIA 33
    Design Flow Rate 33
    Channel Roughness 34
    Velocity 34
    Freeboard 34
    Maintenance Access 35
  ALTERNATIVES FEASIBILITY AND THEIR SIGNIFICANT IMPACTS 35
    "No Project" Alternative 35
    Alternative Solutions—Guadalupe Slough to Highway 101 (Reaches 9-12) 37
      1. Flood Basins 37
      2. Floodwalls 37
      3. Raised Reinforced Earth Levee 38
      4. Combination Floodwalls and Levee Raising 38
    Alternative Solutions—Highway 101 to Lawrence Expressway (Reaches 13-25) 39
      1. Clear Span Bridges at Inadequate Culverts 39
      2. Additional Cells at Inadequate Culverts 39
      3. Floodwalls/Levees Upstream of Inadequate Culverts 39
      4. Combined Elements 40
    Alternative Solutions—Lawrence Expressway to Miller Avenue (Reaches 1-8) 40
      1. Culvert Enlargement with Rock-Lined Sides 40
      2. Culvert Enlargement with Concrete-Lined Channel 41
      3. Culvert Enlargement with Mattress Gabion Channel Lining 41
      4. Culvert Enlargement with Combination Stepped and Mattress Gabion Channel Lining 42
      5. Culvert Enlargement and Essential Channel Improvements 42
    Summary of Alternatives 43
    Project Selection 43
      Guadalupe Slough to Highway 101 (Reaches 9-12) 43
      Highway 101 to Lawrence Expressway (Reaches 13-25) 43
      Lawrence Expressway to Miller Avenue (Reaches 1-8) 43

DESCRIPTION OF THE RECOMMENDED PROJECT 49
  REACH 1: Upstream of Lawrence Expressway to Upstream of Lochinvar Avenue 51
    Proposed Measures 51
      Reach 1A 52
      Reach 1B 52
      Reach 1C 52

Page

Vegetation and Wildlife (Reach 1A) 53
Impacts (Reach 1A) 53
Vegetation and Wildlife (Reach 1B) 53
Impacts (Reach 1B) 54
Vegetation and Wildlife (Reach 1C) 54
Impacts (Reach 1C) 54
Mitigation (Reaches 1A, 1B, 1C) 55
Monitoring 55
Costs 55
REACH 2: Upstream of Lochinvar Avenue to Upstream of Homestead Road 58
Proposed Measures 58
Vegetation and Wildlife 59
Impacts 59
Mitigation 59
Monitoring 60
Costs 60
REACH 3: Upstream of Homestead Road to Upstream of Pruneridge Avenue 63
Proposed Measures 63
Reach 3A 63
Reach 3B 64
Vegetation and Wildlife (Reach 3A) 64
Impacts (Reach 3A) 64
Vegetation and Wildlife (Reach 3B) 65
Impacts (Reach 3B) 65
Mitigation (Reaches 3A and 3B) 65
Monitoring (Reaches 3A and 3B) 66
Costs 66
REACH 4: Upstream of Pruneridge Avenue to Upstream of Tantau Avenue 69
Proposed Measures 69
Vegetation and Wildlife (Lower 1,300 Feet) 70
Vegetation and Wildlife (Upper 300 Feet) 70
Impacts 70
Mitigation 71
Monitoring 71
Costs 71
REACH 5: Upstream of Tantau Avenue to Upstream of Interstate 280 73
Proposed Measures 73
Vegetation and Wildlife 74
Impacts 74
Mitigation 74
Monitoring 75
Costs 75
REACHES 6 and 7: Upstream of Interstate 280 to Upstream of Stevens Creek Boulevard . 77
REACH 8: Upstream of Stevens Creek Boulevard to Upstream of Miller Avenue 78
Proposed Measures 78
Vegetation and Wildlife 79
Impacts 79
Mitigation 79
Monitoring 80

Page

Costs 80

REACH 9: Guadalupe Slough to Upstream of Highway 237 83

- Proposed Measures 83
- Vegetation and Wildlife 84
- Impacts 85
  - Direct Impacts of Construction 85
  - Long-Term Impacts of Maintenance Activities 85
  - Impacts to Special Status Species 85
- Mitigation 86
- Monitoring 86
- Costs 86

REACH 10: Upstream of Highway 237 to Upstream of Old Mountain View-Alviso Road . . 91

- Proposed Measures 91
- Vegetation and Wildlife 92
- Impacts 92
- Mitigation 92
- Monitoring 92
- Costs 92

REACH 11: Upstream of Old Mountain View-Alviso Road to Upstream of Tasman Drive . 95

- Proposed Measures 95
- Vegetation and Wildlife 96
- Impacts 96
- Mitigation 97
- Monitoring 97
- Costs 97

REACH 12: Upstream of Tasman Drive to Upstream of Highway 101 102

- Proposed Measures 102
- Vegetation and Wildlife 103
- Impacts 103
- Mitigation 104
- Monitoring 104
- Costs 104

REACH 13: Upstream of Highway 101 to Upstream of Arques Avenue 107

- Proposed Measures 107
- Impacts 108
- Mitigation 108
- Monitoring 108
- Costs 108

REACH 15: Upstream of Central Expressway to Upstream of Kifer Road 111

- Proposed Measures 111
- Impacts 112
- Mitigation 112
- Monitoring 112
- Costs 112

REACH 16: Upstream of Kifer Road to the Upstream of the Southern Pacific Railroad . . . 115

- Proposed Measures 115
- Impacts 115
- Costs 115

Page

REACHES 17 THROUGH 24: Upstream of the Southern Pacific Railroad to Upstream of Pomeroy Avenue 117
REACH 25: Upstream of Pomeroy Avenue to Upstream of Benton Street 118
Proposed Measures 118
Impacts 118
Mitigation 119
Monitoring 119
Costs 119
REACH 26: Upstream of Benton Street to Upstream of Lawrence Expressway 121

MAINTENANCE PROGRAM 123
MAINTENANCE ACTIVITIES 123
Reaches 1A, 1C, 2, 3B, 4, 5 123
Reach 1B 123
Reach 3A 124
Reach 6 124
Reach 7 124
Reach 8 124
Reach 9 125
Reach 10 125
Reach 11 125
Reach 12 125
Reaches 13-26 126
MAINTENANCE STANDARDS 126

SIGNIFICANT ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES 133
BIOLOGICAL AND AESTHETIC IMPACTS 133
Mitigation and Monitoring of Biological and Aesthetic Impacts 135
ARCHEOLOGICAL IMPACTS 136
Mitigation and Monitoring of Archeological Impacts 136
IMPACTS TO LOCAL DRAINAGE 139
Mitigation of Local Drainage Impacts 139
Monitoring of Mitigation of Local Drainage Impacts 139
CONSTRUCTION-RELATED IMPACTS 139
Mitigation of Construction-Related Impacts 140
Monitoring of Mitigation for Construction-Related Impacts 141
GROWTH INDUCING IMPACTS 141

PROJECT COST, FINANCING, AND STAGING 145

CONCLUSIONS AND RECOMMENDATIONS 149

Page

FIGURES

1 Project Location Map 2
2 Regional Location Map 14
3 Calabazas Creek Watershed Map 15
4 Existing Conditions (Photographs—4 pages) 18*
5 Flooding on Calabazas Creek (Photographs—6 pages) 24*
6 One Percent Flood Map 26
7 Recent Erosion Repair and Sediment Removal Projects 30
8 Erosion Conditions (Photographs—1 page) 30*
9 Maintenance (Photographs—2 pages) 32*
10 Typical Sections Showing Riparian Revegetation Scheme 137
11 Typical Section Showing Wetland Revegetation Scheme 138

TABLES

1 Project Cost Summary 11
2 Design Flows and Existing Culvert Capacities 25
3 One Percent Flood Damages 28
4 Design Flow Rates 33
5 Design Channel Roughness Factors 34
6 Summary of Alternatives 45
7 Maintenance Standards for Sediment & Vegetation Removal 127
8 Summary of Impacts and Mitigation Measures 142
9 Construction Staging 146
10 Existing and Postproject Conditions (Project Impacts) 134

---

*Following page number

Page

PLATES

Title Sheet and Location Map 1
Calabazas Creek—Index to Sheets 2
Calabazas Creek—Plan and Profile (Sta. 0+00-Sta. 11+00) 3
Calabazas Creek—Plan and Profile (Sta. 11+00-Sta. 24+50) 4
Calabazas Creek—Plan and Profile (Sta. 24+50-Sta.38+50) 5
Calabazas Creek—Plan and Profile (Sta. 38+50-Sta. 52+25) 6
Calabazas Creek—Plan and Profile (Sta. 52+25-Sta. 66+00 7
Calabazas Creek—Plan and Profile (Sta. 66+00-Sta. 79+00) 8
Calabazas Creek—Plan and Profile (Sta. 79+00-Sta. 93+00) 9
Calabazas Creek—Plan and Profile (Sta. 93+00-Sta. 101+00) 10
Calabazas Creek—Plan and Profile (Sta. 101+00-Sta.113+45) 11
Calabazas Creek—Plan and Profile (Sta. 113+45-Sta. 127+00) 12
Calabazas Creek—Plan and Profile (Sta. 139+00-Sta.150+20) 14
Calabazas Creek—Plan and Profile (Sta. 150+20-Sta. 162+00) 15
Calabazas Creek—Plan and Profile (Sta. 162+00-Sta. 171+33) 16
    El Camino Storm Drain—Plan and Profile (Sta. 0+00-Sta. 4+00)
    (Sta. 168+61 Calabazas = Sta. 0+00 El Camino Storm Drain)
Calabazas Creek—Plan and Profile (Sta. 248+00-Sta. 258+75) 23
Calabazas Creek—Plan and Profile (Sta. 289+15-Sta. 302+00) 28
Calabazas Creek—Plan and Profile (Sta. 302+00-Sta. 317+60) 29
Calabazas Creek—Plan and Profile (Sta. 317+60-Sta. 331+50) 30
Calabazas Creek—Plan and Profile (Sta. 331+50-Sta. 345+00) 31
Calabazas Creek—Plan and Profile (Sta. 345+00-Sta. 359+50) 32
Calabazas Creek—Plan and Profile (Sta. 359+50-Sta. 374+90) 33
Calabazas Creek—Plan and Profile (Sta. 374+90-Sta. 390+60) 34
Calabazas Creek—Plan and Profile (Sta. 390+60-Sta. 401+25) 35

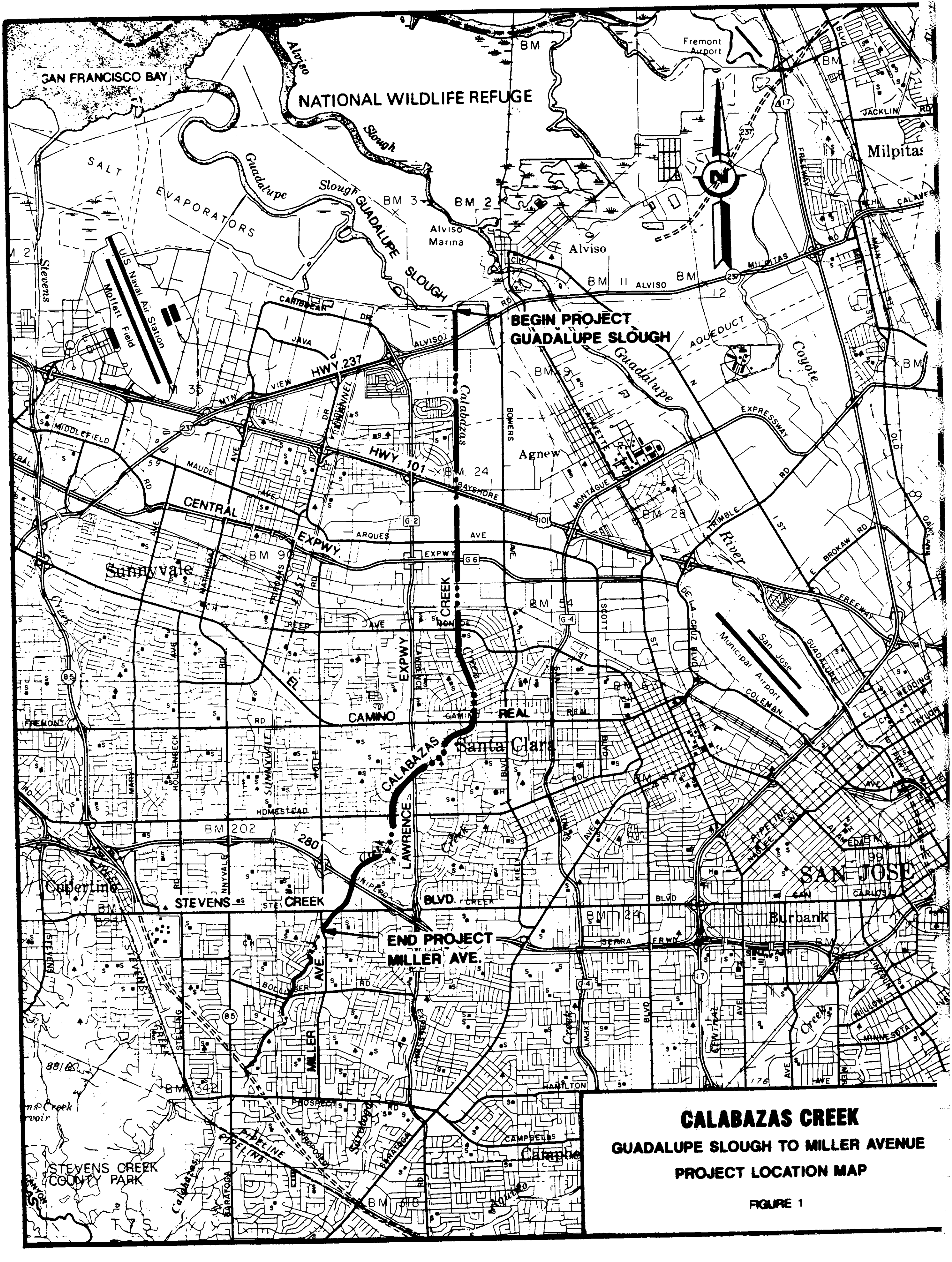
PREFACE

Flooding, erosion, and sedimentation problems have occurred on Calabazas Creek between Guadalupe Slough and Miller Avenue. This report presents the results of an investigation of these problems. The study area consists of approximately 7 miles of channel extending from Guadalupe Slough in the City of Santa Clara, upstream to Miller Avenue in the City of Cupertino (see Figure 1).

The purpose of this study is to define the extent of these problems, evaluate alternative solutions and recommend a project that will protect the community from the 1 percent (100-year) flood and solve the erosion and sedimentation problems.

This report is prepared in accordance with the Santa Clara Valley Water District Act which requires an Engineer's Report for projects that are to be funded with District revenues. It also complies with the California Environmental Quality Act (CEQA) which requires an Environmental Impact Report (EIR) for any project which may have significant environmental impact. On the basis of an initial study consisting of an Environmental Impact Assessment checklist (Appendix T), it was found that the proposed project may have significant effects on the environment and would require preparation of an Environmental Impact Report (EIR). Technical subjects and environmental issues usually addressed separately in an Engineer's Report and an EIR are presented here in a single combined report to provide ease of reading.

The summary that follows offers an overview and description of the flooding, erosion, sedimentation, and other problems associated with this reach of Calabazas Creek and the proposed solutions. The environmental impacts and mitigation program are also summarized. Those interested in more detailed information should read the remainder of the report and the accompanying appendices.



CALABAZAS CREEK

GUADALUPE SLOUGH TO MILLER AVENUE

PROJECT LOCATION MAP

FIGURE 1

SUMMARY

STUDY OVERVIEW

This Engineer's Report presents the results of an investigation of the existing and potential flooding problems of Calabazas Creek. The project study area begins at Guadalupe Slough and extends approximately 7 miles upstream to Miller Avenue. The report describes the alternative solutions studied, presents a recommended project, and evaluates the environmental impacts of the project.

DISTRICT PLANNING GOALS AND OBJECTIVES

It is the objective of the Santa Clara Valley Water District to reduce flood damages in Santa Clara County. The County is divided into five flood control zones. Each zone is defined by watershed boundaries and is essentially a unique fiscal entity. All revenue generated within a zone must be spent on the construction, operation, and maintenance of flood control facilities that benefit that zone.

Flood problems within each zone are first investigated in a long-range planning context. The flood damage reduction needs are identified, assessed, and given a priority ranking on a project-by-project basis within each zone. The criteria used to determine the ranking include many factors but are most heavily weighted toward projects that will prevent the greatest potential flood damage.

After the project study area has been defined, the problems are investigated in a greater level of detail. History and background are also researched and a variety of alternatives, including the impacts of doing nothing, are explored. The District has developed an integrated project planning process that includes evaluation of flood damage reduction, erosion, sedimentation, maintenance, and other concerns. All project alternatives are evaluated within the context of economic feasibility, environmental impact and mitigation, and community acceptability.

It is the policy of the Santa Clara Valley Water District to design flood control projects to safely convey the 1 percent flood with appropriate freeboard. Freeboard requirements are consistent with standards set by the Federal Emergency Management Agency (FEMA), the federal agency responsible for the administration of the National Flood Insurance Program (NFIP), and are described in the Design Criteria Section of this report. The 1 percent flood is discussed in Appendix H and is also the standard level of protection set by FEMA.

It is a requirement of the NFIP that flood insurance be purchased when financing, through federally backed institutions, structures located within a designated flood hazard area. (The National Flood Insurance Program is described in Appendix G.) It is also a goal of the Santa Clara Valley Water District to reduce the public's financial burden of mandatory flood insurance by providing flood protection.

BACKGROUND

Calabazas Creek drains 21.8 square miles in northwestern Santa Clara County and is located in the District's North Central Flood Control Zone. Within the study area the creek flows within the city limits of Santa Clara, Sunnyvale, and Cupertino.

Many efforts have been made to reduce the flood damage potential of Calabazas Creek. Several alignments were tried before the current alignment was established in 1958. In the late 1970s, major channel work was performed between Guadalupe Slough and El Camino Real. In 1983 additional cells were added to the culverts at Pomeroy Avenue, Benton Street, and Lawrence Expressway.

This study investigates all creek related problems between the Guadalupe Slough and Miller Avenue. The leveed reach between Guadalupe Slough and Highway 101 is being restudied because higher tide elevations and rapid accumulation of sediment and vegetation have reduced freeboard during the 1 percent flood to an unacceptable level. Culverts at Highway 101, Central Expressway, Kifer Road, the SPRR, and the inlet transition at Pomeroy Avenue do not safely convey the 1 percent design flood flow. The reach between Lawrence Expressway and Miller Avenue does not have capacity to safely convey the 1 percent flood and is the highest priority flood problem in the District's North Central Flood Control Zone.

PROBLEM DEFINITION

The most serious problems related to Calabazas Creek in the study area are the magnitude of potential flood damage to surrounding properties and the extreme channel maintenance requirements.

Approximately 2,250 structures would be impacted by a 1 percent flood. Estimated damages would total $35.2 million. Over the long-term, average annual flood damages would be about $1.3 million. Of the 24 street culverts within the study limits, 9 are inadequate. These culverts were constructed to convey flows comparable to 5- to 50-year flood (20 percent to 2 percent probability of exceedance) flows by today's standard. The least adequate culvert at Miller Avenue has a 5-year (20 percent) flood frequency. Flooding has occurred at the Miller Avenue culvert four times since 1980.

High channel maintenance expenditures have been required for sediment and debris removal and erosion repair. Based upon past expenditures, estimated annual maintenance costs are approximately $300,000.

ALTERNATIVE SOLUTIONS

Several alternative solutions to the flooding, erosion, and sedimentation problems have been investigated for Calabazas Creek. A detailed evaluation of alternatives is provided in the Alternative Formulation Chapter of this report.

Alternatives investigated include upstream reservoirs, floodplain acquisition, various types of channel modification, bypass channels, and flood basins. Upstream reservoirs and floodplain acquisition were eliminated because of excessive costs.

The proposed project was selected because it provides 1 percent flood protection while minimizing construction and maintenance costs and overall impact to the community and natural environment. The project is a combination of channel and levee modification, bridge replacement, and also includes a short high flow bypass channel.

PROPOSED PROJECT

A proposed plan for flood, erosion and sediment control, as well as future maintenance, is presented in this report. The channel modifications include modifying 15,000 feet of existing levee, constructing 11,000 feet of floodwall, and constructing 9,000 feet of gabion-lined channel. The proposed plan includes modification or replacement of 13 bridges or culverts. Also included in the plan are 5,000 feet of depressed maintenance road and 25 channel access ramps. The total estimated cost of the project is $16.5 million. The equivalent average annual cost is $1.20 million.

The project includes raising the existing levees and constructing depressed maintenance roads between the Guadalupe Slough and Tasman Drive. Areas have been designated where certain vegetation will be allowed to establish on in-stream sediment benches. Bridges at Moffett Park Drive, Old Mountain View-Alviso Road, and Tasman Drive would be floodproofed. Access ramps are proposed at all bridges.

Upstream of Tasman Drive a floodwall is proposed on the west bank. On the east bank a raised levee is proposed between Tasman Drive and the Mission College property. A floodwall would be built on the east bank adjacent to the Mission College property. The existing low flow channel would be made approximately 10 feet wider for 2,500 feet downstream of Highway 101. A habitat area where vegetation would be preserved along the westerly bank is also included in the project.

From Highway 101, low levees are proposed for about 1,500 feet upstream. Concrete lining would be extended from the existing channel up the inboard side of the levee. Concrete floodwalls are proposed upstream of Central Expressway and Pomeroy Avenue.

A clear span bridge is proposed to replace the existing box culverts at Kifer Road.

The project includes placing a new parallel box culvert under the Southern Pacific Railroad tracks to relocate the El Camino Storm Drain confluence from upstream to downstream of the existing SPRR culvert on Calabazas Creek.

Upstream of Lawrence Expressway the recommended project includes augmenting four inadequate reinforced concrete box culverts with additional cells, replacing the single reinforced concrete box culvert at Miller Avenue with a clear span bridge, regrading most of the existing channel, and placing gabion lining on the channel sides. The project would include installation of mattress gabions where existing vegetation is sparse and the existing right of way is wide enough. Where right of way or significant trees restrict the useable area, narrower channel sections utilizing stepped gabions are specified. A short bypass channel is proposed to avoid a relatively undisturbed length of creek between Lawrence Expressway and Lochinvar Avenue.

The proposed project includes right of way acquisition of approximately 4 acres and obtaining easements under public streets. Acquisition would be from lands presently utilized as orchards and where the District currently has insufficient right of way (or no right of way) along the creek.

The project would include planting and insuring the establishment of thousands of trees and shrubs. The revegetation is designed to reestablish some of the plant and wildlife habitat disturbed by construction, to soften the visual impacts of the proposed flood control channel, and to restore elements of the riparian environment of the creek. This plan is compatible with the functions of flood, erosion and sediment control, and future maintenance activities in the creek.

A detailed reach-by-reach explanation of proposed measures and their costs is provided in the chapter titled Description of Proposed Project. Recommendations for future maintenance activities following construction of the project are provided in the chapter titled Maintenance Program Standards.

ENVIRONMENTAL IMPACTS

The significant impacts that would result from this project and the measures proposed to mitigate these impacts are as follows:

Biological Impacts

Guadalupe Slough to Tasman Drive (Reaches 9-11)

The project will result in the removal of 1.7 acres of brackish marsh vegetation and 0.06 acres of willow riparian vegetation. The amount of vegetation removed will depend upon the timing of construction relative to periodic channel maintenance. Mobile wildlife will be temporarily displaced and relatively immobile species will be eliminated.

Temporary adverse impacts to riparian, wetland, and aquatic habitat will occur during reconstruction of the low flow channel. These impacts will be essentially the same as those resulting from regularly scheduled maintenance activities which are undertaken within the existing channel. The aquatic habitat will restore itself within the new channel. Sloped banks of the new low flow channel are expected to naturally revegetate with coastal brackish marsh and emergent vegetation as has occurred in the past.

The postproject maintenance program will be less intense than the current maintenance program. Sediment benches supporting emergent wetland vegetation are expected to form in some of these areas. Because the sediments would be removed less frequently, the average fish habitat area would be reduced.

Tasman Drive to Highway 101 (Reach 12)

Impacts to existing vegetation, wildlife, and in-stream habitat will be minimal. Temporary impacts will occur during construction and will be less than those resulting from regularly scheduled maintenance activities.

Over 3 acres are proposed to remain undisturbed by maintenance activities, allowing habitat to reestablish.

Lawrence Expressway to Miller Avenue (Reaches 1-8)

The project will result in the removal of approximately 6 acres of riparian habitat, including approximately 162 trees of varying size and maturity (Appendix M). This represents about 49 percent of the trees located in these reaches.

Wildlife which is dependent on the riparian habitat will be reduced in number and diversity but probably will not be eliminated. Most of the existing animal population is expected to become reestablished as has occurred in the past.

Mitigation of Biological Impacts

Guadalupe Slough to Tasman Drive (Reaches 9-12)

To offset the 1.7 acre loss of coastal brackish marsh in Reaches 9-11, the easterly levee in Reach 9 and adjacent San Tomas Aquino Creek will be reconstructed to allow for the creation of 1.7 acres of natural wetland. The 1.7 acre mitigation area will be revegetated with wetland plant species. Details of the revegetation program and monitoring plan are included in Appendix S.

It is the intent of the design to allow an equilibrium or natural state to develop with sufficient channel capacity remaining to safely convey the 1 percent design flood. If dredging becomes necessary in Reach 11, a secondary channel with a center island will be established to provide for additional fish habitat.

To minimize impacts to wildlife, clearing and construction will not begin until after July 1, when the breeding season of most species is complete. Burrowing owls are not known to currently inhabit the Calabazas Creek levees. However, since eliminating a burrowing owl burrow could be a potentially significant impact, surveys will be made for burrowing owls, prior to reconstructing levees. If discovered, a plan will be developed for relocating the burrowing owls prior to commencement of construction.

Lawrence Expressway to Miller Avenue (Reaches 1-8)

A revegetation program is planned to replace lost vegetation and to restore as much of the riparian habitat as possible without interfering with operation and maintenance of the flood control channel. Revegetation of 8.3 acres is planned with approximately 4,500 plantings. Plantings will consist of native vegetation compatible with the creek environment. Trees, shrubs, and ground cover have been selected for wildlife habitat value, as well as aesthetic appeal. A channel maintenance program has been developed to be compatible with the goals of the revegetation program. Postconstruction monitoring of the revegetation program will be carried out to follow its progress and to correct any problems that may occur. Details of the revegetation program and the monitoring plan are included in Appendix S.

Aesthetic Impacts

Guadalupe Slough to Lawrence Expressway (Reaches 9-26)

The construction of raised levees and concrete floodwalls will result in adverse aesthetic impacts. Construction of depressed maintenance roads within the channel will enlarge the nonvegetated surface area resulting in an aesthetic impact.

Lawrence Expressway to Miller Avenue (Reaches 1-8)

A long-term adverse aesthetic impact will result from straightening the creek, lining the banks with gabions, and constructing access ramps. A temporary aesthetic impact will be the removal of vegetation, especially unavoidable removal of large trees.

Mitigation of Aesthetic Impacts

Guadalupe Slough to Lawrence Expressway (Reaches 9-26)

To soften the visual impact of concrete floodwalls, the exterior side will be architecturally treated where readily visible. Maintenance ramps will also be architecturally treated. The architectural treatments could involve the use of color tints and textured concrete.

Lawrence Expressway to Miller Avenue (Reaches 1-8)

The revegetation program will eventually produce mature vegetation along the upper portion of the slopes which will soften and screen the artificial appearance of both the gabions and the uniform side slopes of the modified channels. The mattress gabions and the shelf area of the stepped gabions will be covered with soil to mitigate the structural appearance of the modified channel and to encourage natural revegetation with grassed and weedy species. The mitigation plan is described in the chapter entitled ''Significant Environmental Impacts and Proposed Mitigation Measures.''

Archeological Impacts

Two possibly significant archeological sites have been identified adjacent to the project area. The archeological reports are contained in Appendices Q and R.

Mitigation of Archeological Impacts

Earthmoving activities in these two areas will be monitored by a qualified archeologist. In the event cultural materials are exposed during construction, the archeologist will examine them and make appropriate recommendations.

IMPACTS TO LOCAL DRAINAGE

Between Guadalupe Slough and about 1,500 feet upstream of Highway 101, water levels during floods would be slightly higher with the proposed project than without the project. For the 1 percent flood flow rate, the increase in water surface is approximately 1 foot with a 3 to 5 hour duration. Increased water elevation in the creek caused by the proposed project would slightly increase the frequency of ponding in the streets in areas without storm water pumping stations.

MITIGATION OF IMPACTS TO LOCAL DRAINAGE

Flap gates would be provided at storm drain outlets in order to prevent reverse flow. Maintenance of the flap gates will be the responsibility of the District, or if by agreement, the owners of storm drain systems.

CONSTRUCTION-RELATED IMPACTS

Construction activity will increase dust and exhaust emissions locally, probably exceeding air quality standards intermittently. Daytime construction noise and ground shaking is expected to disturb residents and wildlife adjacent to the creek. Graded soil surfaces will be subject to increased wind and water erosion from the time of initial grading until establishment of permanent vegetative ground cover or stabilization of the soil. All roads will remain open to traffic. In some areas adjacent to construction sites, traffic may be delayed or detoured as a safety measure. These impacts, taken together, would result in a significant adverse impact.

MITIGATION OF CONSTRUCTION-RELATED IMPACTS

Contractors will be required by the construction specifications to follow applicable federal, state, and local guidelines, laws, and regulations to minimize soil erosion, water, air, and noise pollution during construction. Traffic control will be coordinated with the Cities of Santa Clara, Sunnyvale, and Cupertino. Conditions imposed on contractors implementing the project would mitigate the construction-related impacts. District inspectors would ensure compliance through monitoring and on-site inspection.

COMMUNITY INVOLVEMENT

During the course of the study, District staff has met with various homeowners, residents, businesses, and public agencies. A public meeting was held in May 1986 at Cupertino High School to discuss Calabazas Creek from Lawrence Expressway to Miller Avenue. District staff described the flooding and maintenance problems and alternatives to solve the problems. The proposed plan was to enlarge inadequate culverts, regrade the channel and install mattress gabion lining on the channel banks. The 75 people in attendance all generally supported flood control efforts.

Some changes to the proposed project resulted from comments received at the public meeting. The plan was modified to include more expensive stepped gabions with variable side slopes where tree removal could be avoided. Tree loss was reduced from 95 percent to 49 percent.

The modified plan was presented to a committee of federal and state regulatory agency representatives in March 1987. These agencies formally review the project when a permit is sought from the U. S. Army Corps of Engineers under Section 404 of the Federal Clean Water Act. In response to concerns of the regulatory agencies, a Habitat Evaluation Procedure (HEP) was prepared (Appendix S-III). To offset habitat loss indicated by the HEP, the project was modified to include a bypass channel in Reach 1 to avoid impacting existing habitat and a widened channel for about 1,200 feet upstream of Homestead Road to provide for greater reestablishment of in-stream vegetation.

The resulting plan was presented at a public map review in August 1987. The majority of those in attendance were supportive of the project and the efforts which had been made to save existing trees where possible. Some still expressed opposition to the project because of tree removal. It was requested that the District investigate a rock lined channel and an alternative addressing only sections with less than 1 percent capacity or severe erosion. These additional alternatives were investigated. No changes to the recommended project resulted from the additional alternatives or comments received at the map review. In December 1988, a public map review was held to present the plan for Calabazas Creek from Guadalupe Slough to Lawrence Expressway. Approximately 20 people attended. No one expressed major objections to the project. Only minor changes to the project resulted from comments received.

The draft Planning Study Report was circulated for public review beginning September 19, 1989. A public hearing was held on October 25, 1989 at Wilcox High School. Appendix W contains the comments received on the draft report and the corresponding District responses.

In response to comments from the Department of Fish and Game on the draft EIR, a preliminary wetlands determination was completed. The project was revised in Reaches 9-11 to further reduce impacts on wetlands and to create replacement wetlands.

PROJECT COST, BENEFITS, AND FINANCING

The proposed project is estimated to cost approximately $16.5 million. The equivalent average annual cost in $1.2 million. The estimated average annual benefit of providing flood protection is $1.41 million. The benefit to cost ratio is approximately 1.2.

The proposed schedule for completing the project relies on existing revenues (property tax allocation and flood control benefit assessments) and debt financing by way of certificates of participation or another borrowing mechanism.

An estimate of reach-by-reach costs and proposed measures are summarized in Table 1.

CONSTRUCTION STAGING

The project will be constructed over a 3- to 4-year period commencing in the 1992-93 construction season.

It is proposed that the portion of the creek between Lawrence Expressway and Homestead Road, Reaches 1 and 2, be constructed first, followed by Reaches 9-13, between Guadalupe Slough and Arques Avenue, followed by Reaches 15-25, between Central Expressway and Benton Avenue, followed by Reaches 3-5 between Homestead Road and Highway 280, and then Reaches 7 and 8, between Stevens Creek Boulevard and Miller Avenue. This proposed schedule would provide the maximum amount of flood protection as soon as possible without inducing flooding downstream.

Installation of revegetation shall be undertaken in fall or early winter to coincide with the planting season, and shall be implemented within 12 months of completion of the flood control improvements. If scheduling is not feasible in the first planting season after construction is complete, then the period may be extended up to 18 months.

TABLE 1
Calabazas Creek
Project Cost Summary

Reach	Limits	Proposed Measures	Estimated Construction Cost	Total Cost[1]
1	U/S Lawrence Expwy. to u/s Lochinvar Avenue	Mattress & stepped gabions. Bypass channel. Add two 12 x 10′ Culverts at Lochinvar.	$1,405,000	$2,494,000
2	U/S Lochinvar Ave. to u/s Homestead Road	Mattress & stepped gabions. Add two 11′ x 10′ culverts at Homestead.	$893,000	$1,119,000
3	U/S Homestead Road to u/s Pruneridge Avenue	Stepped gabions. Add two 11′ x 10′ culverts at Pruneridge.	$1,331,000	$2,123,000
4	U/S Pruneridge Avenue to u/s Tantau Avenue	Stepped & mattress gabions. Add two 11′ x 10′ culverts at Tantau.	$1,359,000	$1,679,000
5	U/S Tantau Avenue to d/s Interstate 280	Mattress gabions. Culvert modifications at I-280.	$728,000	$930,000
6	D/S Interstate 280 to u/s Vallco Parkway	No measures proposed.	0	0
7	U/S Vallco Parkway to u/s Stevens Creek Blvd.	No measures proposed.	0	0
8	U/S Stevens Creek Blvd. to u/s Miller Avenue	Stepped gabions. Clear span bridge at Miller.	$1,357,000	$1,756,000
9	U/S Guadalupe Slough to u/s Highway 237	Raised levees (4′). Maintenance roads. Floodproof Moffett Park Drive bridge. Raised bridges at Hwy. 237 (by Caltrans).	$661,000	$824,000
10	U/S Highway 237 to u/s Old Mountain View Alviso Road	Raised levees (4′). Depressed maintenance road. Floodproof Old Mountain View-Alviso Road bridge.	$228,000	$269,000

---

[1] Includes cost for engineering, construction, right of way, mitigation and inspection. See Appendix F for detailed cost estimates.

TABLE 1
Calabazas Creek
Project Cost Summary
(Continued)

Reach	Limits	Proposed Measures	Estimated Construction Cost	Total Cost[1]
11	U/S Old Mountain View-Alviso Road to u/s Tasman Dr.	Raised levees (4'). Maintenance roads. Floodproof Tasman Drive bridge.	$728,000	$860,000
12	U/S Tasman Drive to u/s Hwy. 101	Floodwall on west bank. Raised levee (4') 3,000' u/s of Tasman, then floodwall to Hwy 101. Maintenance Roads.	$1,567,000	$1,849,000
13	U/S Hwy. 101 to u/s Arques Ave.	Floodwall at Hwy 101 culvert entrance. Low levees 1,500' u/s. Maintenance Roads.	$339,000	$401,000
14	U/S Arques Ave. to u/s Central Expwy.	No measures proposed.	0	0
15	U/S Central Expwy. to u/s Kifer Road	Floodwall at Central Expwy. Culvert entrance floodwalls at top of channel bank. New clear span bridge at Kifer Road.	$1,199,000	$1,415,000
16	U/S Kifer Road to u/s SPRR	Relocate El Camino storm drain confluence d/s of SPRR via new culvert.	$586,000	$691,000
17-24	U/S SPRR to u/s Pomeroy Ave.	No measure proposed.	0	0
25	U/S Pomeroy Ave. to u/s Benton St.	Floodwall at Pomeroy Ave. Culvert entrance floodwalls at top of bank for 760' u/s of Pomeroy Ave.	$130,000	$153,000
26	U/S Benton St. to u/s Lawrence Expwy.	No measures proposed.	0	0
		Project Totals	$12,511,000	$16,525,000

---

[1] Includes cost for engineering, construction, right of way, mitigation and inspection. See Appendix F for detailed cost estimates.

STUDY BACKGROUND

This chapter of the report discusses the Calabazas Creek watershed, the current study area, the streamside biological and visual conditions, and previous studies.

THE CALABAZAS CREEK WATERSHED

Calabazas Creek is located in northern Santa Clara County (see Figure 2) and it lies within the District's North Central Flood Control Zone. Calabazas Creek drains an area of 21.8 square miles. Major tributary streams are Prospect Creek, Rodeo Creek, and Regnart Creek. Tributary drainage facilities include Junipero Serra Channel and El Camino Storm Drain. A portion of the flows from Junipero Serra Channel are diverted into Sunnyvale East Outfall. A general map of the watershed is shown in Figure 3.

Basin elevations range from sea level to about 2,000 feet above sea level in the Santa Cruz Mountains. Calabazas Creek is steep in the mountainous areas, then flattens to a gentler slope as it crosses the valley floor. The mountainous areas are characteristically brushy woodlands. The valley floor areas are extensively urbanized.

The area has a generally mild climate. Temperatures range from an average high of 81 degrees during July to an average low of 49 degrees in January. Mean annual precipitation ranges from about 37 inches in the upper watershed to 16 inches on the lower valley floor. About 90 percent of the rainfall takes place in the 5 months, November through March. The steep nature of the upper portion of the watershed results in short duration, high intensity runoff for most major storms.

After each major runoff event, low flows continue in the stream for several weeks as water temporarily stored in the watershed seeps into the streams.

The upland portion of the watershed has experienced low density residential development. The relatively flat valley floor, on the other hand, has been extensively developed in recent years. Field and orchard lands have been transformed into residential subdivisions, shopping centers, and commercial areas. Some undeveloped orchard land does remain on the valley floor, including some lands bordering Calabazas Creek within the proposed project limits.

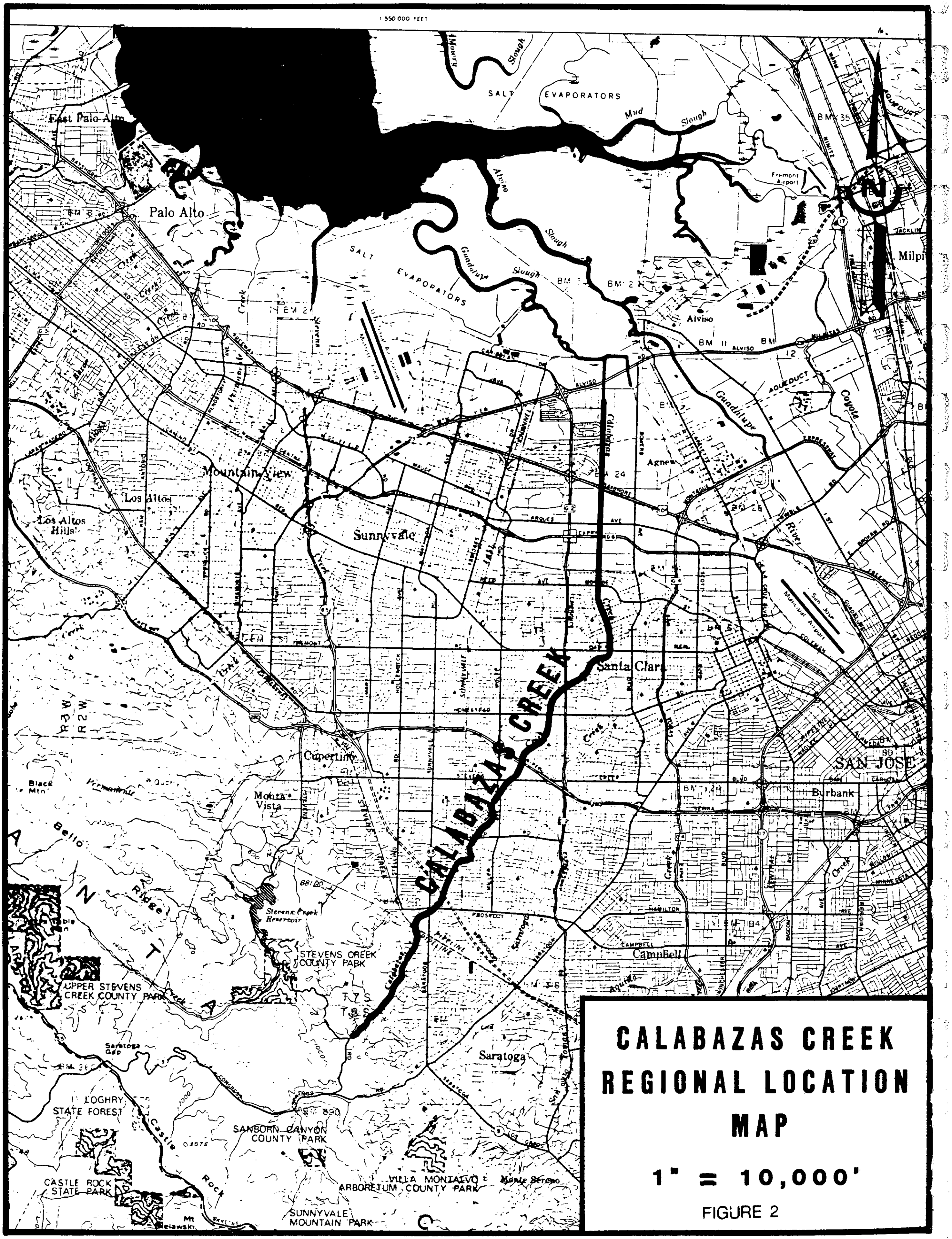
STUDY AREA

The Calabazas Creek study area extends from Guadalupe Slough upstream to Miller Avenue. In this area, the creek flows within the city limits of Santa Clara, Sunnyvale, and Cupertino. The adjacent properties are occupied by residential, commercial, industrial, and agricultural developments and vacant lands.

Previous Studies and Construction

Various studies addressing flooding and erosion problems on Calabazas Creek have been performed over the years.

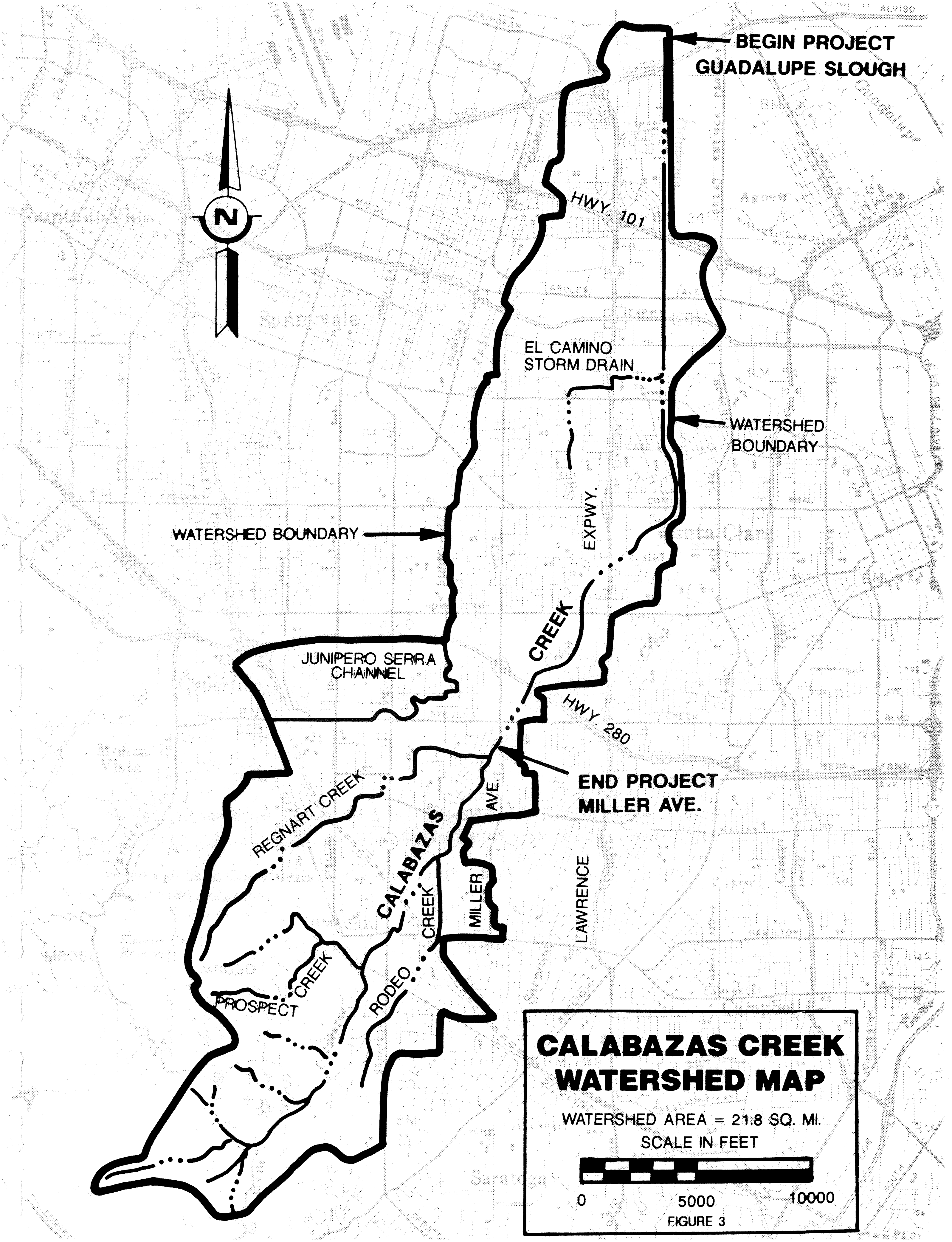
Early in the 20th century, industrial and agricultural interests built a series of levees on the South Bay frontage from Mayfield Slough near Palo Alto to Steamboat Slough at Alviso. These levees were built to form salt evaporation ponds and to reclaim inundated lands for farming.



CALABAZAS CREEK REGIONAL LOCATION MAP

1" = 10,000'

FIGURE 2


BEGIN PROJECT
GUADALUPE SLOUGH
N
HWY. 101
EL CAMINO
STORM DRAIN
WATERSHED
BOUNDARY
WATERSHED BOUNDARY
EXPWY.
CREEK
JUNIPERO SERRA
CHANNEL
HWY. 280
END PROJECT
MILLER AVE.
REGNART CREEK
CALABAZAS
AVE.
CREEK
MILLER
LAWRENCE
CREEK
PROSPECT
RODEO
CALABAZAS CREEK
WATERSHED MAP
WATERSHED AREA = 21.8 SQ. MI.
SCALE IN FEET
0
5000
10000
FIGURE 3

In building the levees, much land was thus reclaimed by making it no longer subject to inundation by the daily tidal action of San Francisco Bay. However, in the process of constructing the levees, five major outlets for winter runoff were dammed off, causing diversion and ponding of the waters from seven creeks and the Guadalupe River.

Among the major outlets that were cut off was Guadalupe Slough, which was the outlet for all of the creeks in the North Central Zone, as well as a supplementary outlet for the Guadalupe River. Guadalupe Slough has since been reopened to form an outfall for the three major creeks of the North Central Zone (Saratoga, Calabazas, and San Tomas Aquino Creeks) thus reserving Alviso Slough exclusively for the outfall of the Guadalupe River.

The northerly reach of Calabazas Creek from El Camino Real to Guadalupe Slough was relocated by farmers along straight property lines prior to the turn of the century, and has been relocated or modified three times since 1900. The first relocation was by the State Division of Highways about 1910 when the State adopted and improved El Camino Real as a State highway. The channel was diverted along the southerly side of El Camino to Saratoga Creek. This channel was quite flat and did not function. About 1914, the channel was relocated by a joint State-County project. This route was along the existing channel alignment to the vicinity of Barkley Avenue, thence northeasterly to a confluence with Saratoga Creek near the northerly end of Bowers Park. The second diversion, although at a better grade, was not designed to carry major flood flows. In addition to being inadequate, a massive log jam formed upstream of a farm bridge during the 1955 flood, and floodwaters from Calabazas Creek joined those of Saratoga and San Tomas Aquino Creeks to cause flooding of up to 3 feet in depth over the surrounding areas. Following the 1955 flood, the Santa Clara Valley Flood Control and Water Conservation District realigned the creek to its original outfall in Guadalupe Slough along the previously mentioned "farmers alignment" shown to exist on 19th century maps.

In 1961, a report was prepared by the Santa Clara County Flood Control and Water Conservation District addressing several proposed flood control projects in the North Central Flood Control Zone. The study recommended an excavated earth channel with levees and drop structures for Calabazas Creek upstream of El Camino Real. The 1961 report also recommended enlarging the existing culverts under Lawrence Expressway, Benton Street, and Pomeroy Avenue. This construction began in 1962. The completed project provided protection from flooding; however, the earth channel between El Camino Real and Lawrence Expressway continued to erode. The City of Santa Clara concrete-lined the reach between El Camino Real and Pomeroy Avenue. Erosion problems and a reevaluation of the watershed hydrology resulted in concrete-lining of the channel between Pomeroy and Lawrence Expressway in 1971.

Flooding and erosion problems from Highway 101 to El Camino Real were addressed in a report prepared by the Santa Clara Valley Water District in 1975. The report recommended a trapezoidal concrete-lined channel with enlarged culverts at the street and railroad crossings. The recommended project was constructed in 1979.

More recently, Calabazas Creek from Guadalupe Slough to the Highway 101 was studied in 1977 by the Santa Clara Valley Water District. The report recommended enlarging the creek by constructing an earth channel with levees and raising the westbound lane bridge of Highway 237. In 1980, the recommended improvements were constructed, with the exception of the Highway 237 bridge raising. (The bridge raising is expected to be done by the Santa Clara County Traffic Authority in 1992.)

In 1979, commercial developers realigned the creek between Stevens Creek Boulevard and Vallco Parkway in a double cell reinforced concrete box culvert and between I-280 and Vallco Parkway in a trapezoidal earth channel.

Culverts at Pomeroy Avenue, Benton Avenue, and Lawrence Expressway were enlarged in 1980.

Hydrogeologic Setting

In the study area, Calabazas Creek traverses an alluvial fan generally composed of discontinuous silts, sands, and gravels to depths of approximately 1,500 feet. The portion of the fan nearer to the foothills has continuous subsurface water transmission characteristics which allow the recharge of the underlying aquifer. This area is known as the forebay zone and the aquifer is referred to as unconfined. Nearer to the San Francisco Bay, the alluvial fan has alternate subsurface layers of impervious and pervious deposits. This layering inhibits vertical groundwater transmission and creates separate aquifers. This area is referred to as the confined zone. The lower aquifers in the confined zone are recharged laterally with waters from the forebay zone. These lower aquifers supply water for beneficial uses. The upper aquifers in the confined zone are recharged by surface waters including urban drainage and saltwater from San Francisco Bay. The dividing line between the forebay and confined zone, for practical purposes, is where Calabazas Creek crosses Lawrence Expressway.

The Santa Clara Valley Groundwater Subbasin receives its principal recharge from Calabazas Creek and other streams and percolation ponds. Portions of Calabazas Creek within the study area are used to recharge imported water. Since 1967, when the Stevens Creek Pipeline was completed, this District has had the capability to release water into Calabazas Creek for artificial recharge. Based on a June 1985 gaging, it has been estimated that the groundwater recharge potential in the study area, between Lawrence Expressway and Miller Avenue, is approximately 2.25 acre-feet per day, which is a moderate rate of recharge. Under actual operation between 1982 and 1985, the facility has provided between 0.6 and 1.7 acre-feet of recharge per day. Over the past 6 years, the depth to groundwater in the study area has varied from 170 to 140 feet. Future SCVWD water supply plans are based on supplementing existing recharge capacities including that of Calabazas Creek.

Environmental Setting

Streamside Visual Quality

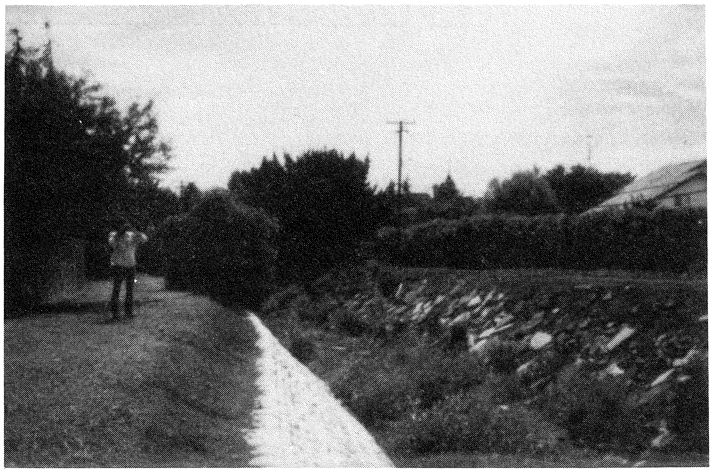
Photographs of existing conditions along Calabazas Creek are included in Figure 4.

Between Guadalupe Slough and Highway 101, Calabazas Creek is a straight prismatic earth channel with levees on both sides.

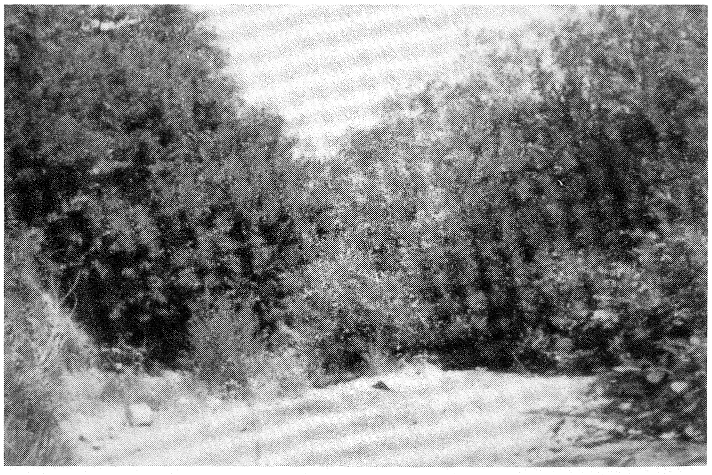
Downstream of Tasman Drive (Reaches 9-11) the channel is trapezoidal with a bottom width of 60 to 110 feet. The levees have side slopes which vary between 1½ to 1 and 3 to 1. The levees rise approximately 15 feet above the channel bottom and 6 to 12 feet above lands adjacent to the creek. Trees, shrubs, grasses, and reeds are found on the channel bottom. The vegetation occurs in various stages of maturity depending upon when the last channel clearing took place. This vegetation generally enhances the visual quality of the channel. The levee sides and top are barren earth. In some locations, adjoining industrial developments have placed a landscaped strip between the levee and their parking lots.

CALABAZAS CREEK
EXISTING CONDITIONS

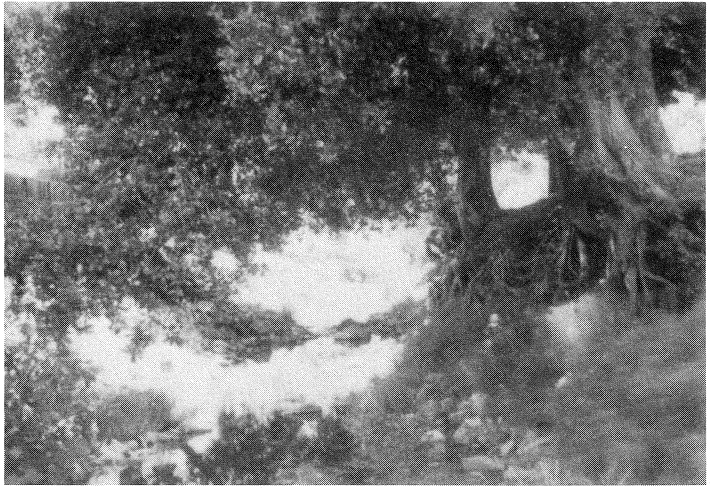
FIGURE 4



Reach 1
Looking upstream from Lawrence Expressway. Note sacked concrete and concrete rubble bank protection. S 2029-3



Reach 1
Looking downstream from within the channel 800 feet upstream of Lawrence Expressway. Note dense riparian vegetation. S 2029-5



Reach 2
Looking upstream from Lochinvar Avenue. Note undermined oak trees on right bank. S 2029-18

Upstream of Tasman Drive to Highway 101 (Reach 12) the watercourse includes both a low flow channel and an elevated floodplain. The low flow channel situated along the westerly levee is approximately 25 feet wide and 12 feet below the top of levee. The floodplain is elevated approximately 3 feet above the low flow channel and is 55 to 65 feet wide. Thick tree (mostly willow), shrub and reed growth occurs mainly along the low flow channel. Growth in the elevated floodplain is mainly grasses and weeds. The vegetation occurs in various stages of maturity depending upon when the last channel clearing took place. This vegetation generally enhances the visual quality of the channel.

The levee sides and top in this reach are barren earth. Backyard fencing, mostly wooden and in various states of disrepair, is located along the outside of the westerly levee. About ½ of the easterly levee is bordered by industrial developments. In some locations a strip between the levee and the parking lots has been landscaped. In the southern half of this reach the easterly levee is a small mound. A paved road parallels the berm.

Between Highway 101 and Lawrence Expressway, Calabazas Creek is a concrete-lined channel. The channel is below grade. Along the majority of the creek there are unpaved maintenance roads along the top of bank on either side. Tall eucalyptus trees grow along the top of the banks for about 1 mile where the creek is in the median of Calabazas Boulevard.

The visual quality of the creek between Lawrence Expressway and Miller Avenue (Reaches 1-8) is varied. The majority of the reaches are earth channels which were constructed by developers or farmers. Most of these channels have experienced bank erosion and required maintenance repairs. Streamside vegetation ranges from abundant to sparse.

There are a few isolated sections north of Lawrence Expressway and Pruneridge Avenue that are relatively undisturbed and very pleasant; however, these are the exception. Concrete rubble and loose rock have been used to prevent erosion in Calabazas Creek. Other practices which have degraded the visual setting include the disposal of garden cuttings and other trash over the bank by adjacent homeowners, and the discarding of waste such as crankcase oil, into the creek channel.

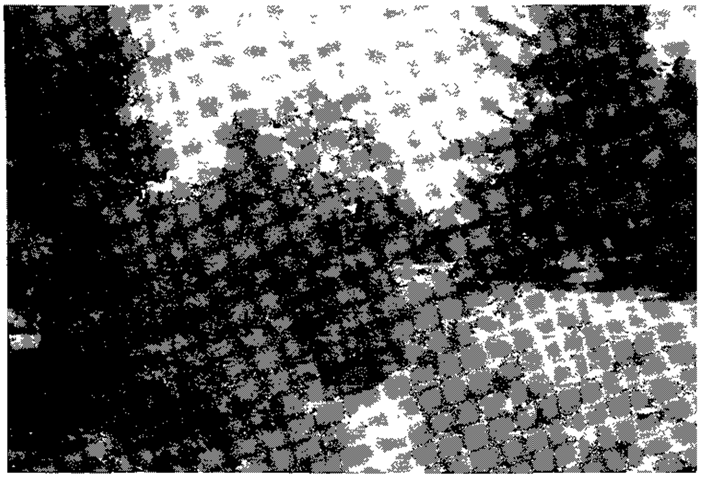
There are approximately 1.5 miles of backyard fences along both sides of the creek. For most of the length, the fences are in generally good condition; however, there are a few that are deteriorated and broken. Many of the homeowners have planted dense landscaping along the fences which enhances the visual setting and also provides screening and some degree of security.

Streamside Biological Conditions

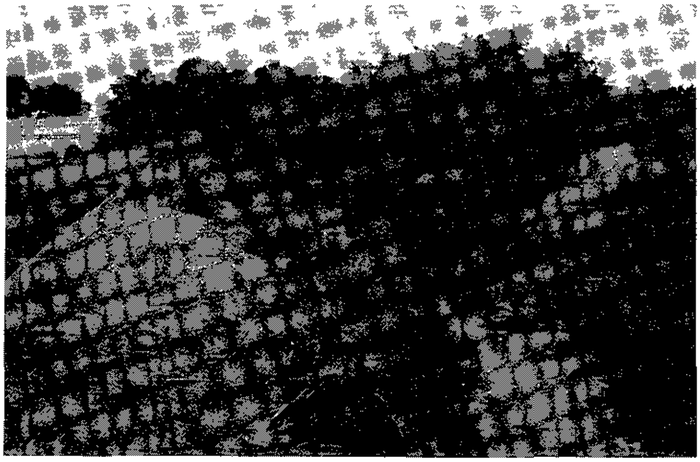
Calabazas Creek from Guadalupe Slough to Highway 101 includes six habitat types, including emergent wetland, salt-affected tidal marsh, upland vegetation, riparian shrub/forest, open water-mudflats, and recently cleared ground. A description of these habitat types follows.

Emergent wetland consists of cattails and bulrushes bordering or within the Calabazas Creek channel. Along the lower reaches of the creek, it may range in width from 10 to 30 feet. Emergent wetland vegetation is a valuable wildlife resource and provides wildlife with cover,

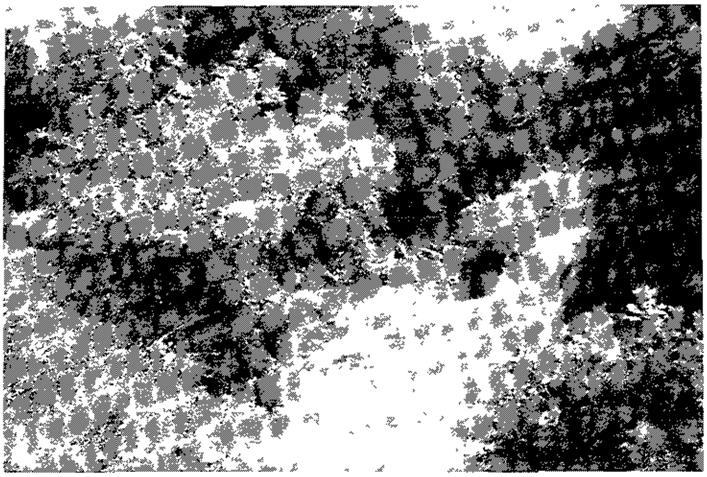
FIGURE 4
(continued)



Reach 2
Looking downstream from Homestead Road. Note riparian trees on channel bank and introduced redwood on right bank.
S 2029-29

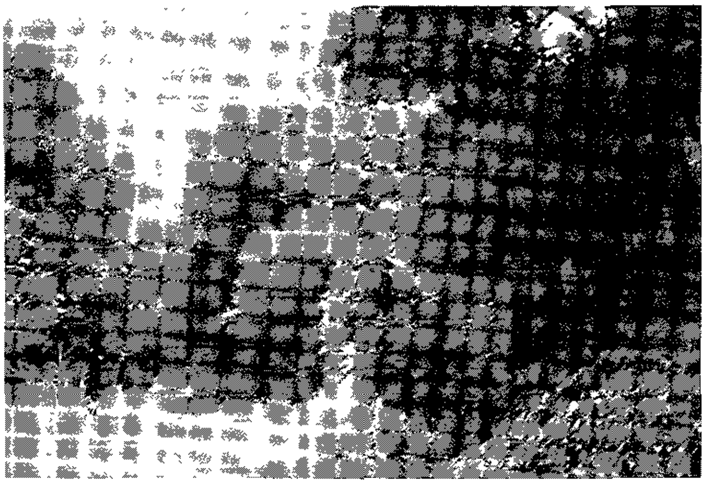


Reach 3
Looking downstream from 500 feet upstream of Homestead Road. Note dense willow thicket and adjacent industrial parking lot.
S 2029-30

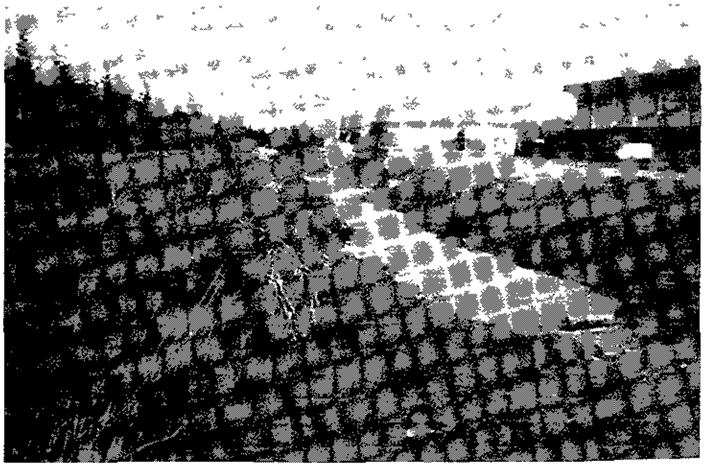


Reach 3
Looking upstream from 1,500 feet upstream of Homestead Road. Note dense riparian vegetation on channel banks.
S 2029-46

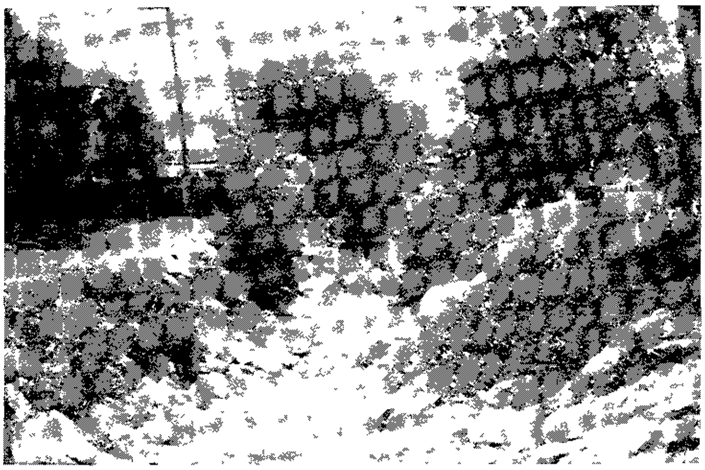
FIGURE 4
(continued)



Reach 4
Looking downstream from 400 feet upstream of Pruneridge Avenue. Note riparian trees on channel bank. S 2029-45

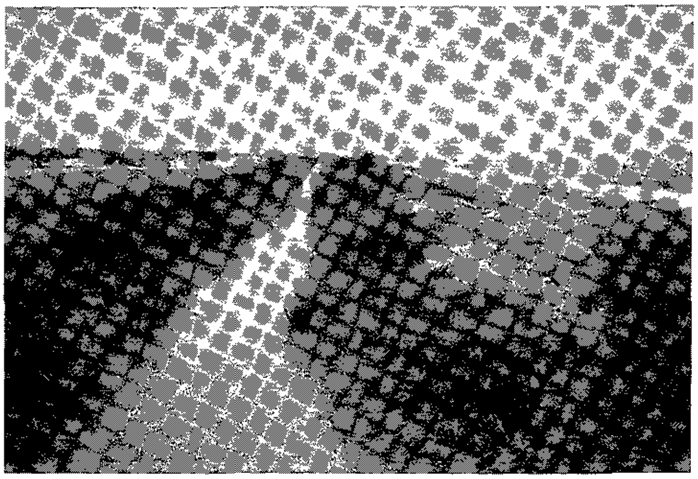


Reach 5
Looking downstream from Highway 280. Note sparsely vegetated channel bank and absence of trees. S 1382-26

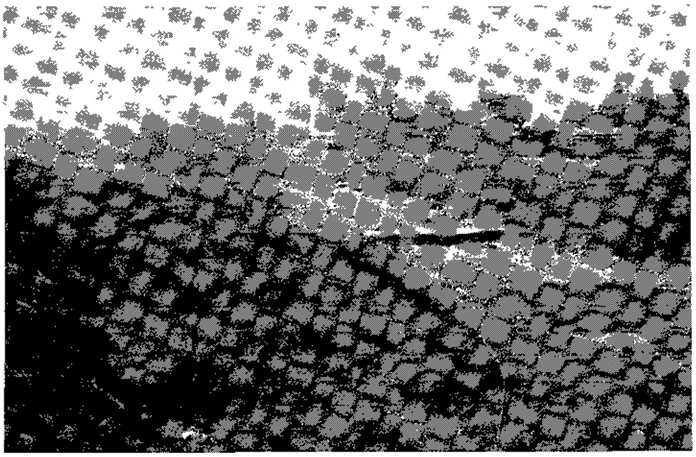


Reach 8
Looking downstream from Miller Avenue. Note riparian and introduced trees on channel banks, and concrete rubble on channel banks and bottom. S 2029-34

FIGURE 4
(continued)



Reach 9
Looking downstream from Highway 237. Note emergent wetland.
S 1834-5



Reach 12
Looking upstream adjacent to the Mission College campus. Note fresh water riparian vegetation.
S 2245-33

foraging, and breeding grounds. Typical species inhabiting bulrush and cattail wetlands include Virginia rail, red-winged blackbird, common yellowthroat, song sparrow, marsh wren, opossum, and raccoon.

Salt-affected tidal marsh only occurs in a narrow strip along the downstream portion of Calabazas Creek where the influence of the tides is pronounced. The characteristic plant species in this habitat type include pickleweed, alkali heath, and peppergrass. This thin patch of tidal marsh is too small to be treated as a distinct habitat type by wildlife. In general, most of the species inhabiting the emergent wetland or upland vegetation are also found in the tidal marsh.

Upland vegetation occurs upon elevated floodplain upstream of Tasman Drive and includes annual grasses, weedy herbaceous vegetation, and scattered shrubs. The dominant species are wild oat, rip-gut, brome, fennel, and yellow star thistle. Patches of elderberry shrubs and coyote brush occur in the upland habitat type. Dense thickets of weedy vegetation provide cover and foraging grounds for species such as black-tailed jackrabbit, ring-necked pheasant, white and golden-crowned sparrows, and dark-eyed juncos. This habitat type is a lower quality wildlife resource than emergent wetland or riparian scrub/forest vegetation but is valuable in conjunction with riparian and other wetland habitats.

Riparian scrub/forest occurs along the low flow channel on the upper reaches of Calabazas Creek, beyond the reach of the tidal salt waters. This habitat type consists of sandbar willows, young cottonwoods, and arroyo and yellow willows. Riparian vegetation is one of the most valuable wildlife habitats along Calabazas Creek. It supports a greater density and diversity of animal species than any other vegetation type. Some of the species that use the riparian scrub/forest for breeding, foraging, or cover include green backed heron, mourning dove, Anna's hummingbird, black phoebe, bushtit, Bewick's wren, northern mockingbird, yellow-rumped warbler, striped skunk, opossum, and raccoon.

Open water-mudflat occurs in the downstream reaches of Calabazas Creek. There is considerable variation in the amount of exposed mud as a result of tidal fluctuation. Crayfish and other invertebrates inhabit the mudflats. Killdeer, common snipe, and mammalian predators such as opossum and raccoons are attracted to mudflat foraging grounds.

Aquatic vegetation, including smartweed, knotweed, watercress, and water primrose, occurs within the open water habitat. Ruddy ducks, cinnamon teal, mallards, gadwall, American coot, and common moorhen use the open water for resting and foraging.

Recently cleared ground is a result of ongoing operations by SCVWD maintenance crews. The cleared areas are devoid of vegetation and have little wildlife value. Recently cleared ground will change to another habitat type in the growing season following the clearing activity. Depending on the characteristics of the site (proximity to water and slope), emergent wetland, riparian scrub/forest, or upland vegetation will cover the site in one to two seasons if left undisturbed.

There are a total of 19.0 acres of coastal brackish marsh and willow/riparian communities between Guadalupe Slough and Highway 101.

Between Highway 101 and Lawrence Expressway, Calabazas Creek consists of concrete-lined channels with bare earth maintenance roads. They are treated with herbicides to eliminate any vegetative growth. Any fauna present within these reaches are coincidental and are expected to depend upon adjoining properties as their habitat.

The plant communities along Calabazas Creek between Lawrence Expressway and Miller Avenue are comprised of several different components. These include native riparian vegetation, other Central California natives, introduced weeds, nonnative ornamentals encroaching from the nearby backyards and nonnative trees.

Although the nonnative plant species dominate the native plants, both in number (60 nonnative to 32 native) and area covered, the native riparian and other Central California native plants nevertheless still provide a significant contribution to the Calabazas Creek flora. No rare or endangered species were observed within the project area (see Appendix K for a list of major plant species in the project area).

The dominant riparian plants are trees which tend to be located either at the channel toe or at the top of bank. Many of the important riparian tree species indigenous to this part of California are represented along Calabazas Creek. Coast live oak, willow, valley oak, blue elderberry, California sycamore and black walnut are found along many reaches of the creek.

The other native plants along the creek are primarily represented by shrubs (poison oak, coyote brush, mule fat, California coffeeberry, etc.) and vines (blackberry). The top of the bank is generally heavily vegetated with weedy nonnative plants such as thistles, mustards, grasses, cheeseweed, curly dock and filaree, all common introduced plants now found in the Santa Clara Valley.

Numerous ornamental plants have spread into the right of way from nearby backyards. Additionally, some residents have sought to beautify the right of way adjoining their property by planting and caring for nonnative plants.

A number of fruit and nut trees have been introduced along the creek, reflecting past orchard cultivation; the most prevalent of these are almond and black walnut. The black walnut has become the dominant tree along the creek. The black walnut may, in many places represent the stump-sprout regrowth of previously felled English walnut trees rather than the original native walnut. Of the introduced trees, eucalyptus, Monterey pine, Chinese elm and blackwood acacia are prevalent at various sites.

It is possible to discern several differences in the types and density of vegetation along the creek due to man's influence. Some examples of these types are: the formation of trails and subsequent elimination of vegetation on some banks due to intensive human foot traffic; the elimination of undergrowth in developed (park-like) areas; mowed areas for weed abatement; the presence of ornamentals in landscaped areas; the lack of vegetation in herbicide-sprayed area; and the unnatural shape of natives in managed areas. In addition, bank erosion has resulted in the loss of vegetation along various stretches of the creek. Erosion repair measures inhibit revegetation at many of these locations.

Riparian plant communities together constitute one of the most productive of all California wildlife habitats in terms of numbers and diversity of animal species that are dependent upon this community for all or part of their existence. The continued presence of riparian habitat along Calabazas Creek is integral to maintaining wildlife in the immediate area. There are several locations along the creek that currently support significant wildlife populations, these being the sites which contain the largest concentrations of native tree and shrub species. These areas are found along Subreach 1B and Reach 4.

Listings of observed and potential wildlife and plant species are provided in Appendices J and K, respectively.

Special Status Species

Salt marsh harvest mice, listed as endangered by both the U. S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG), could potentially inhabit Reach 9 and the downstream portion of Reach 10. The vegetation and topography of these reaches is distinctly different from what is typically described as characteristic and optimal habitat for this species. The preferred habitat of salt marsh harvest mice consists of a dense cover of pickleweed mixed with fat-hen and alkali heath (Fisler 1965). They require a dense vegetative cover that is beyond the reach of high winter tides, and prefer a relatively high and stable level of salinity in their food and water (USFWS 1984). Recent studies, however, indicate that this species can occur in marginal habitats different from that described above. Zetterquist (1977) found salt marsh harvest mice between a channel and in a marsh near Alviso. Sorenson (1988) also reports the occurrence of this species in narrow drainage ditches near the south San Francisco bay. Salt marsh harvest mice have been trapped near Alviso Slough, less than 4 kilometers from Calabazas Creek (USFWS 1984).

Harvey and Stanley Associates (Appendix N) live-trapped Reach 9 from May 9 to June 4, 1988. The only species captured in 560 trap nights were house mouse, California ground squirrel, and western harvest mouse. Based on their analysis of the habitat quality and their trapping results, Harvey and Stanley Associates concluded that Calabazas Creek was inappropriate habitat for salt marsh harvest mice.

Clapper rails, listed as endangered by both the USFWS and CDFG, have habitat affinities similar to those of salt marsh harvest mice. In the south San Francisco bay, clapper rails are rarely found in brackish marshes and occur almost exclusively in salt marshes dominated by cordgrass and pickleweed (USFWS 1984). The probability of this species occurring along the lower reaches of Calabazas Creek are very low (Sorenson 1988).

Black rails, listed as threatened by the CDFG, are unlikely to occur along Calabazas Creek. This species prefers tidal salt marshes of pickleweed and cordgrass, but also occurs in brackish or freshwater marshes (Manolis 1978). They occur in high, shallow water marshes with little annual or daily fluctuations in water levels (Manolis 1978). There are no recent breeding records for black rails in the south bay (Page 1988). This species is much more widely distributed in winter compared to the breeding season (Manolis 1978). Black rails might use this reach as wintering habitat, but it is very unlikely that they breed along Calabazas Creek.

Reach 9 of Calabazas Creek was surveyed for black rails on September 1 and November 2, 1988. Surveys lasted between 45 to 60 minutes and consisted of broadcasting the taped calls of a black rail, then listening for a response. No black rails responded to the tape during the surveys.

The salt marsh yellowthroat is listed as a candidate category 2 species by the USFWS. This species was observed in Reach 9 on November 2, 1988. Recent surveys indicate several breeding pairs at Guadalupe Slough near the confluence of Calabazas Creek and the slough (Hobson et al. 1985). Yellowthroats have also been observed foraging along Calabazas Creek's marsh vegetation along this reach (Hobson et al. 1985).

Burrowing owls are a Species of Special Concern to the California Department of Fish and Game (Remsen 1978). These owls nest and live in abandoned ground squirrel burrows in open grasslands and other upland habitat. They occasionally inhabit ground squirrel holes in levee slopes. A burrowing owl was observed in November, 1988, in a weedy, vacant lot immediately west of Reach 12. No burrowing owls or their sign (e.g. whitewash, feathers, cough balls, or prey) were observed near the ground squirrel holes on any of the reaches. Ground squirrel holes are relatively rare along Calabazas Creek levees. The SCVWD crews inspect the levees for rodent activities 3 to 4 times each year and actively suppress any rodent burrowing activity by applying rodenticides (Diafacinone) when needed. Burrowing owls can quickly colonize an area, however, and the presence of owls near Reach 12 indicates that they could at some time establish their burrows in the levee slopes of Calabazas Creek.

No rare, threatened, or endangered fish species are present in Calabazas Creek (See Appendices O and P).

Cultural Resources

Archeological evaluations were performed to determine the likelihood of encountering cultural resources. The studies included searching State records and surface surveys. The archival research revealed two possible archaeologically significant sites adjacent to the project area. Near Central Expressway, archeological material was identified in 1974. Another possible site is adjacent to Mission College. The archeologist's reports are included in Appendices Q and R.

PROBLEM DEFINITION

This chapter of the report describes the problems on Calabazas Creek. Historic flooding, potential flood problems, erosion and sedimentation, and maintenance problems are discussed.

HISTORIC FLOODING PROBLEMS

Calabazas Creek has a history of chronic flooding which adversely affects the safety and economic stability of the residents and businesses within its floodplain. The flooding has damaged businesses and residences and created hazardous conditions at roadways. Emergency operations were required to close major thoroughfares and evacuate residences. The frequency and associated danger of the flooding has been a common complaint of those residing and working in the affected area.

One of the largest floods recorded on Calabazas Creek occurred on December 22, 1955. A report prepared by the U. S. Army Corps of Engineers indicates that flood damages sustained in the Calabazas Creek basin during the 1955 storm totalled over $300,000 in 1955 dollars. It was reported that in Sunnyvale alone, over 160 homes were inundated up to a depth of 3 feet.

RECENT FLOODING

More recently, flooding has occurred within the project reach in 1978, 1980, 1983, and 1986. Figure 5 shows the flooding on February 14, 1986 and January 24, 1983. The majority of this recent flooding is attributed to inadequate culverts.

During the storms of January 1983, extensive street flooding and water damage to the Fountainebleu Apartments (located on the east bank at Miller Avenue) was reported to have been caused by overbanking at Miller Avenue. The San Jose Mercury reported that "In Cupertino 60 people were evacuated early Monday from flooded units in the Fountainebleu Apartments on Miller Avenue. They were able to return home about five hours later."

In the February 1986 storms, overbanking occurred at six inadequate culverts in the study reach. Waters escaping from the channel at Miller Avenue caused flooding up to 1 foot deep, affecting over 50 units of the Fountainebleu Apartments on Miller Avenue, and homes and businesses adjacent to Stevens Creek Boulevard east of Miller Avenue. Floodwaters closed Highway 237. At Tantau Avenue, Pruneridge Avenue, Homestead Road, Lochinvar Avenue and Highway 101, flooding caused damage to residential properties and vehicles, road closures, and left mud and debris on many streets and properties.

POTENTIAL FLOOD PROBLEMS

The bridge for the westbound lanes of Highway 237 is too low. Flooding would occur at the bridge on the average of every 8 years.

This flooding typically results in closure of Highway 237 for a few hours but causes little property damage. A more serious potential problem is the impact of the bridge constriction on the upstream water surface. This bridge will be raised by Caltrans.

In 1986 water was reported to have been within inches of overtopping the levees between Guadalupe Slough to Highway 101. The high stage was attributed to both deterioration of the channel cross section from the design condition and blockage of the channel by the westbound bridge of Highway 237.

Under existing conditions, flooding can also occur just upstream of Highway 101. In 1986 flooding did occur at this location. The culvert capacity was reduced by sediments which accumulated in the downstream channel.

Culverts at Pomeroy Avenue, SPRR, Kifer Road, Central Expressway, and Highway 101 (without sediments) have sufficient capacity to convey a 1 percent flood under existing conditions. These culverts would not have 1 percent flood capacity if upstream channel improvements were made. Of these culverts, SPRR has the least capacity. If the upstream channel were improved and a 1 percent flood occurred, excess flows would spill upstream of the culvert ponding behind the ballast of the railroad, flooding adjacent residences as well as creating a backwater up the El Camino Storm Drain to flood stage.

Flooding at the culverts under Central Expressway and Highway 101 would extend onto the road surface making these thoroughfares impassable for a couple of hours. No flooding of structures would be expected at Central Expressway or Highway 101.

Flooding from Calabazas Creek can occur between Lawrence Expressway and Miller Avenue on an average of about once every 5 years. Approximately 55 percent of the existing channel in this section would be unable to convey the 1 percent flood, however, the major causes of flooding are the inadequate culverts and bridges.

During high flows, the culvert capacities can be significantly reduced by large debris snagging and partially blocking the culverts. The existing culvert capacities (when unobstructed by debris) and the design flow rates are shown in Table 2.

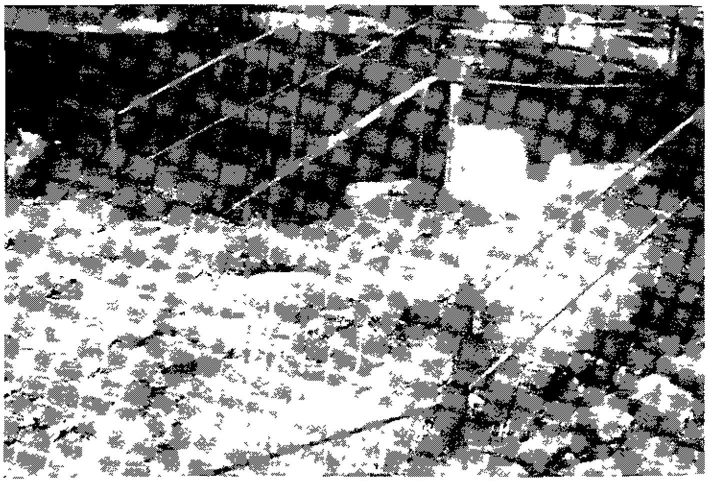
Description of the 1 Percent Flood

The estimated extent of flooding from a 1 percent flood is shown in Figure 6. This map is based on studies prepared by the Federal Emergency Management Agency (FEMA), their local consultant, George Nolte and Associates, and District staff. The map shows FEMA's special flood hazard areas and areas which would be subject to sheet flow or flooding during a 1 percent flood but not identified as special flood hazard areas during the flood insurance studies.

The most significant causes of flooding in the study area are the small culverts at Miller Avenue, and Tantau Avenue. The Miller Avenue culvert has the smallest capacity and a 20 percent chance of flooding in any year. About half of the 1 percent flow (1,200 cfs) would overbank at Miller Avenue and spill to the north and east. To the east, flood flows travel overland across Miller Avenue into residential areas and then return to the creek. To the north, flows travel overland along Miller Avenue to Stevens Creek Boulevard flooding the area bounded by Miller Avenue, Stevens Creek Boulevard and the creek. The flow would split at Stevens Creek Boulevard. Most of the water would flow east along Stevens Creek, flooding the businesses, parking areas and fields adjacent to the street. The remainder of the water would flow north along Wolfe Road and then east along Vallco Parkway flooding the depressed parking areas under the Vallco Financial Center and along Vallco Parkway to depths of 1 foot or greater.

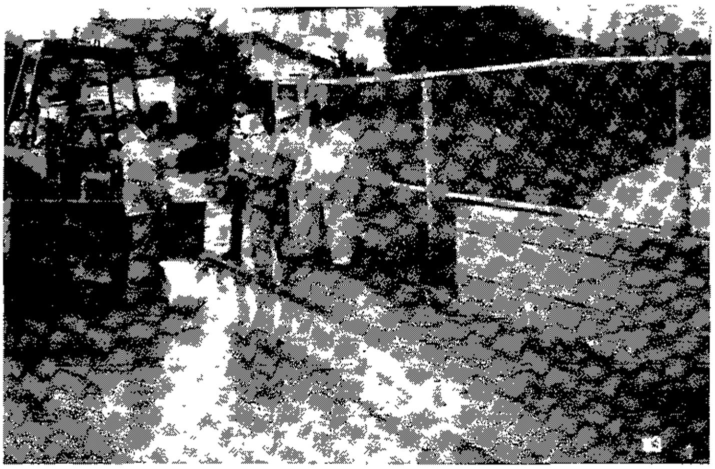
CALABAZAS CREEK
FLOODING JANUARY 1983

FIGURE 5



Looking north from Miller Avenue culvert. Silt laden unstable flow passes under Miller Avenue culvert prior to flood stage. S 410-25

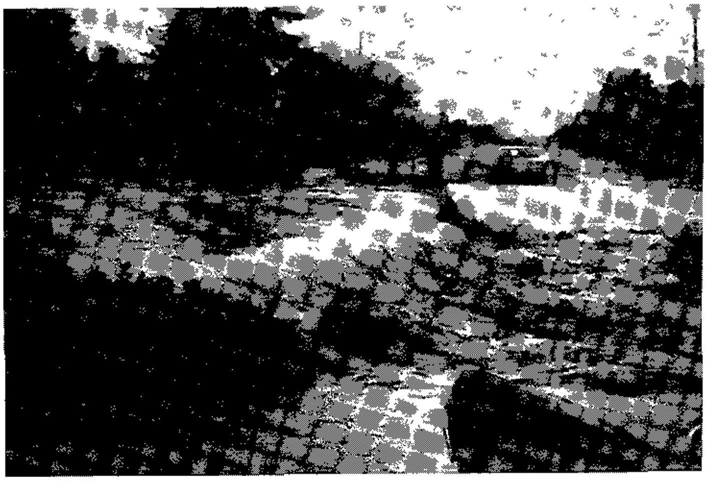
Looking east from Miller Avenue. Clean up crew removes silt from flood damaged Fountainbleu Apartments. Flooding resulted from inadequate culvert at Miller Avenue. S 676-4



Looking north on Miller Avenue. Emergency operations took place during flood. S 676-6

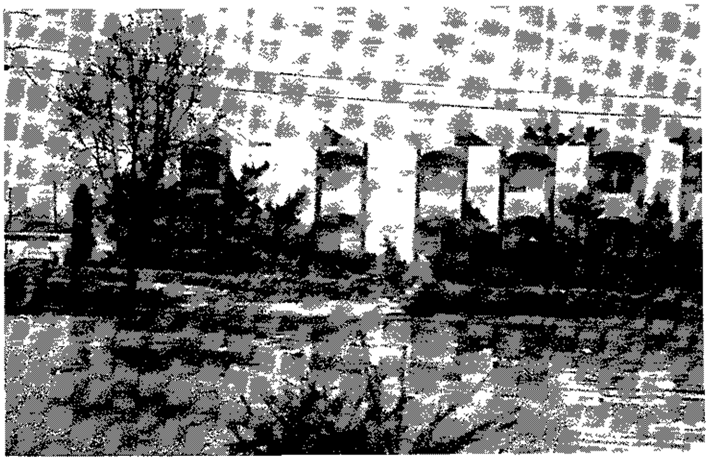
CALABAZAS CREEK
FLOODING FEBRUARY 1986

FIGURE 5



Looking north from Miller Avenue (Reach 8). Note magnitude of spill flowing north on Miller Avenue.
S 1712-45

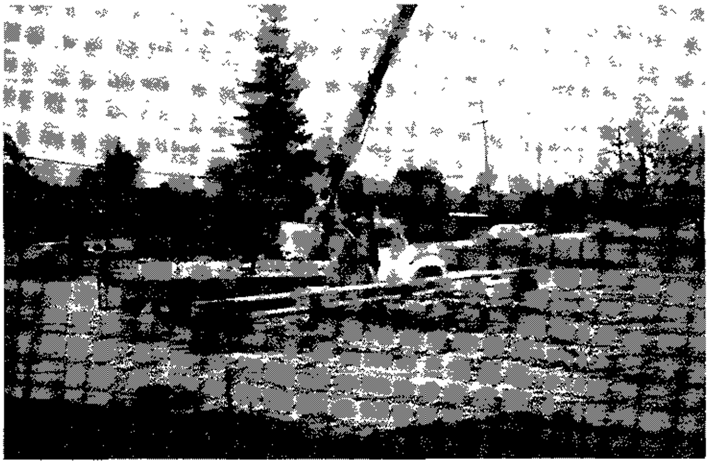
Looking east from Miller Avenue. Note flooding of Fountainbleu Apartments as a consequence of inadequate culvert under Miller Avenue.



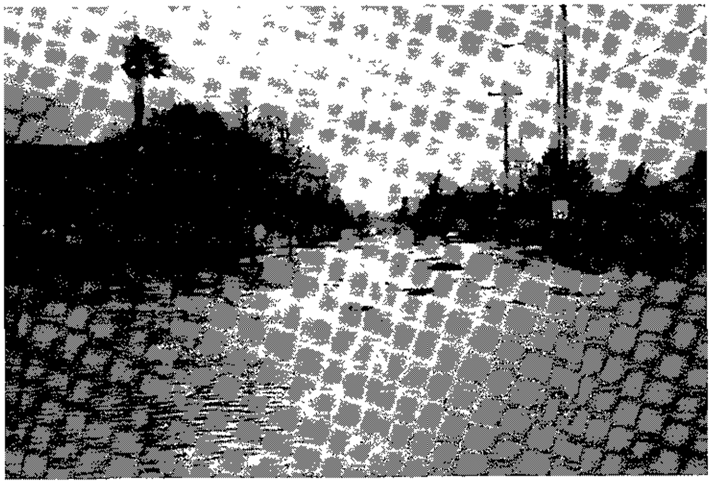
Looking east from Miller Avenue. Note post flooding clean up operations and sandbags which failed to prevent flood damage.

CALABAZAS CREEK
FLOODING FEBRUARY 1986

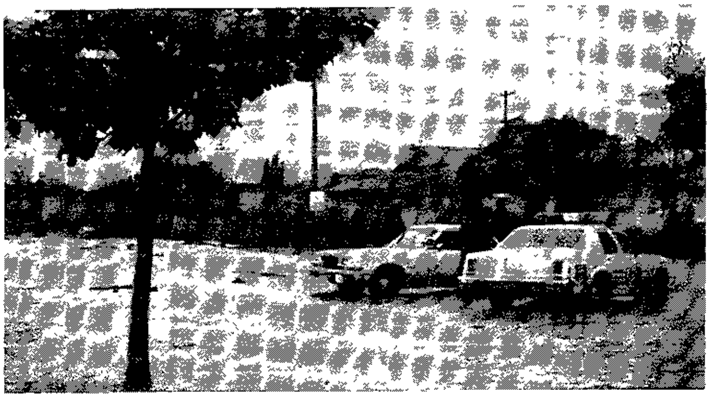
FIGURE 5



Looking north towards Homestead Road. Emergency operations crew dislodges debris from undersized culvert. S 1699-7



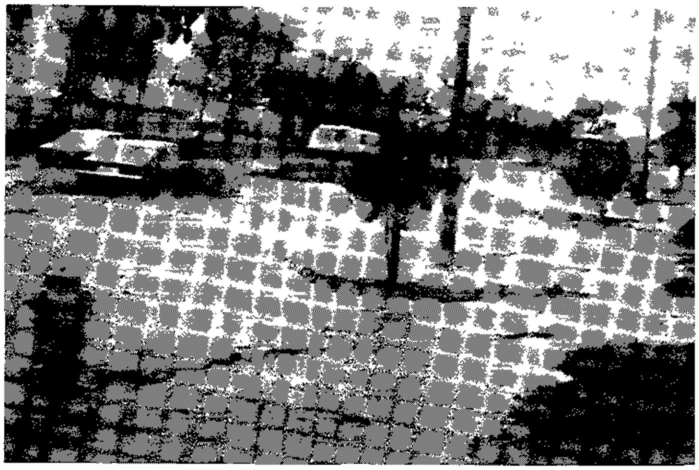
Looking east down Lochinvar Avenue. Flooding resulted from inadequate channel and culvert at Lochinvar Avenue. S1699-8



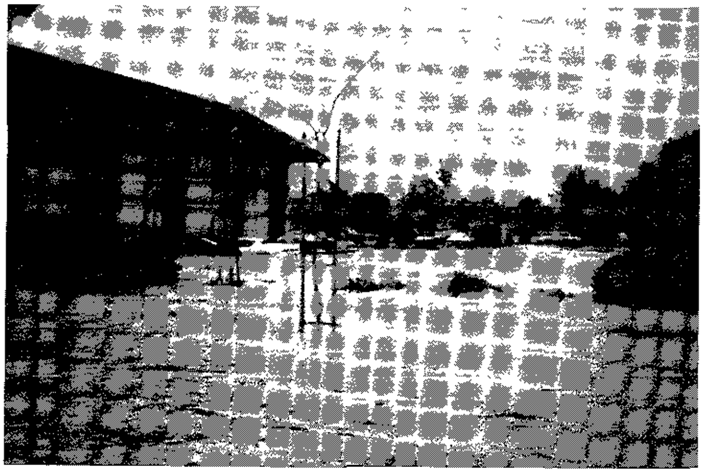
Looking west down Lochinvar Avenue. Hazardous flooding conditions required emergency operations.

CALABAZAS CREEK
FLOODING FEBRUARY 1986

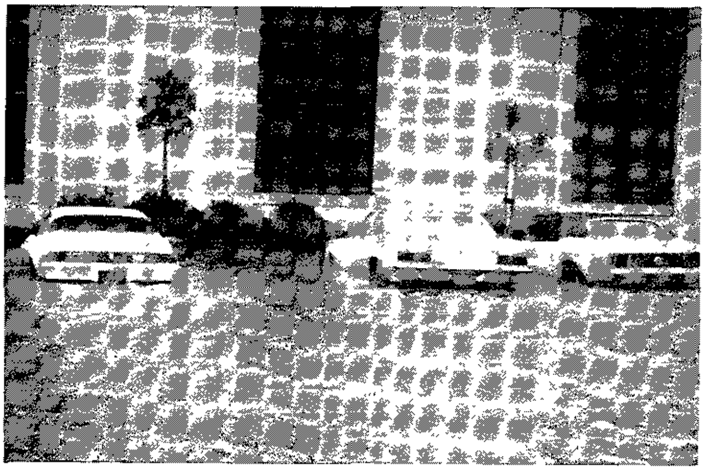
FIGURE 5



Looking east down Stevens Creek Boulevard. Note high velocity flow creating hazard to pedestrian and vehicular traffic. S 1673-12



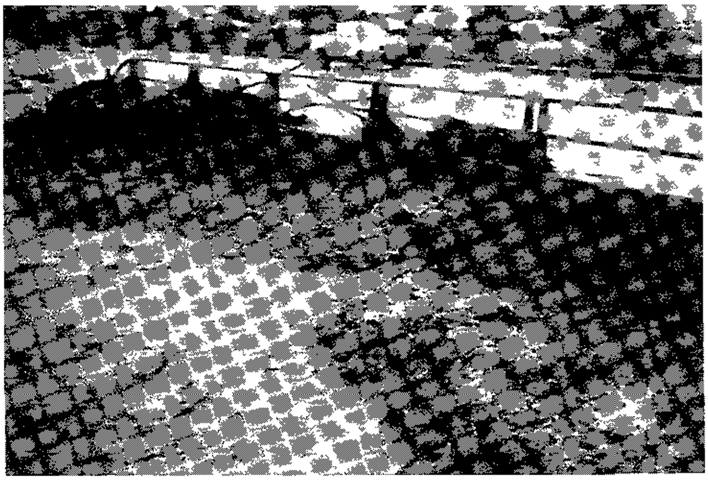
Looking south from Stevens Creek Boulevard (Reach 7). Note flooding in commercial parking area. S 1712-49



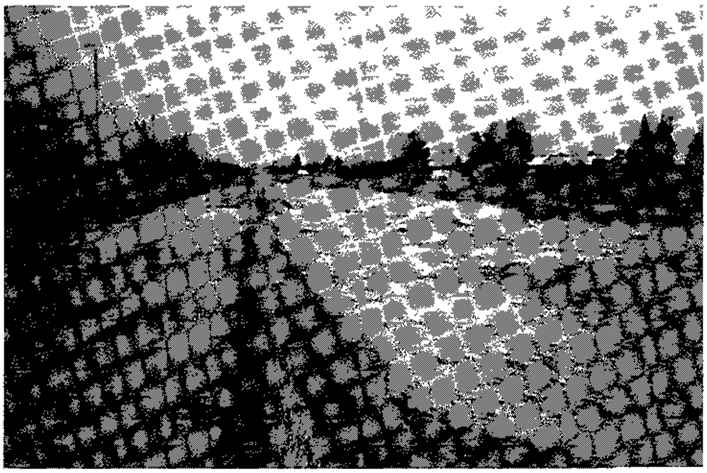
Looking south from Stevens Creek Boulevard. Note flooding of commercial parking areas. S 1672-2

CALABAZAS CREEK
FLOODING FEBRUARY 1986

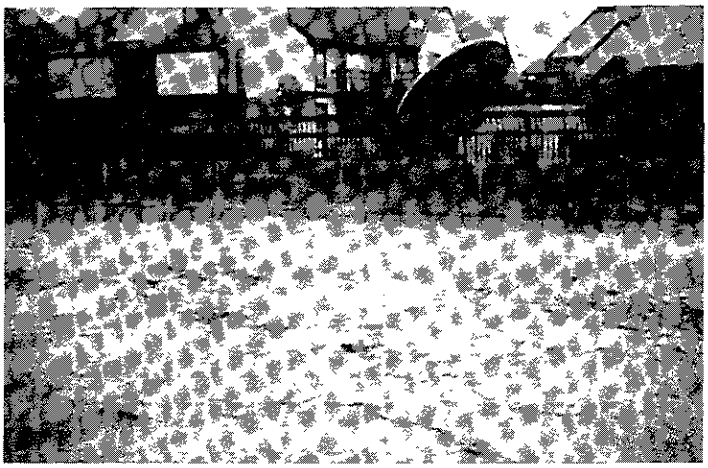
FIGURE 5



Looking north toward Highway 101. Flows entering Highway 101 culvert just below to flood stage. Note debris on the railing which indicates the earlier high water level. S 1669-2



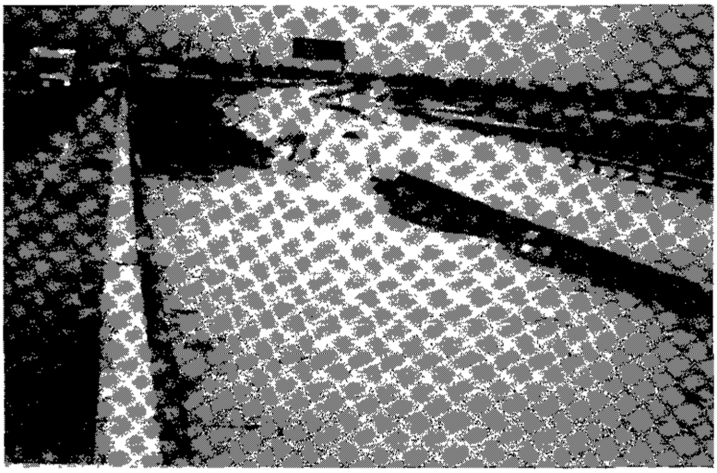
Looking south from Highway 101. Flood flows begin to spill out of channel. S 1668-21



Looking west from channel bank immediately south of Highway 101. Flood flows begin to spill out of channel. S 1669-4

CALABAZAS CREEK
FLOODING FEBRUARY 1986

FIGURE 5

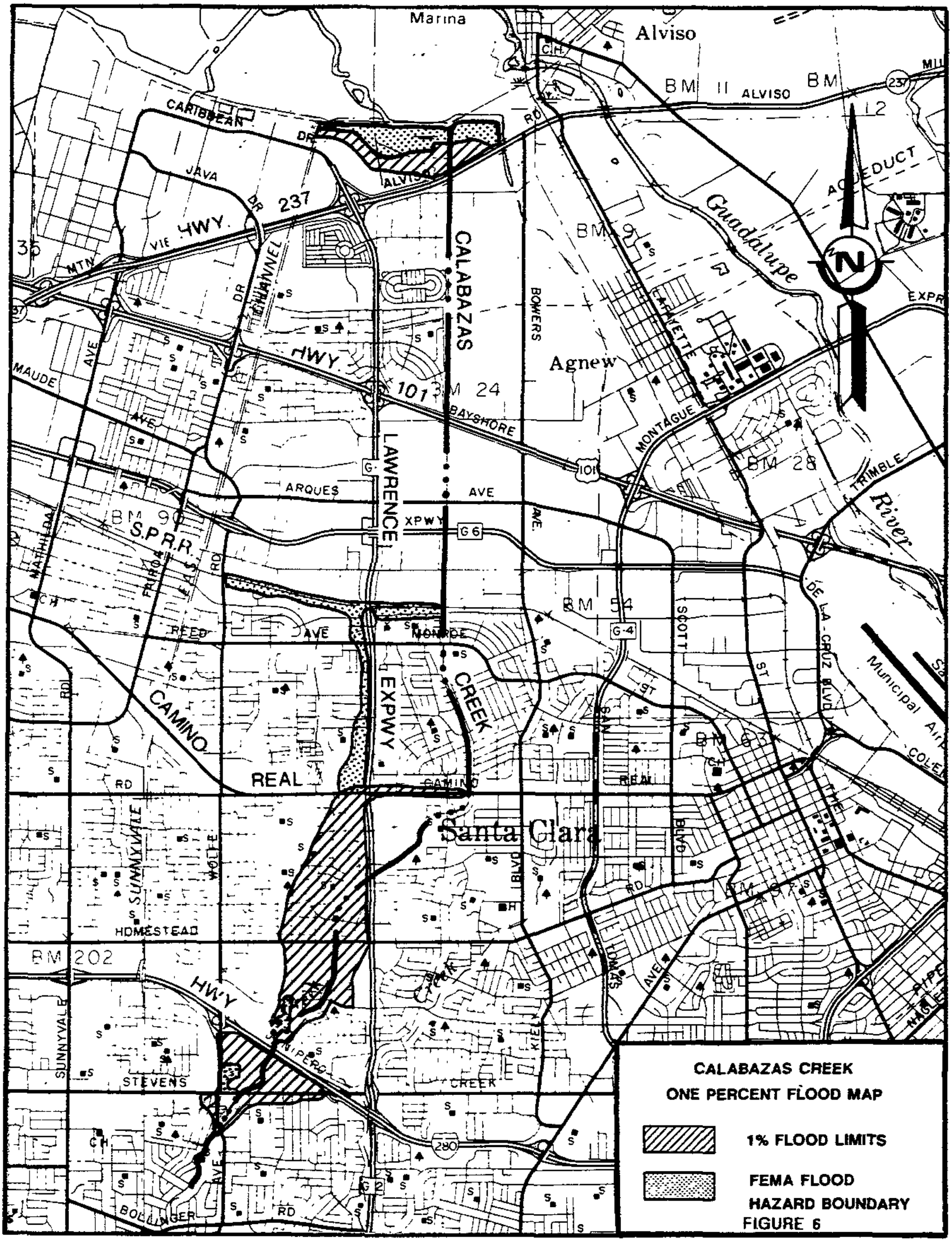


Looking east toward Highway 237 bridge. Westbound lane submerged by flood flows. S 1669-14

TABLE 2
Calabazas Creek
Design Flows and Existing Culvert Capacities

	Design Flows (cfs)		Existing Capacity (cfs)
Location	**Q 1%**	**Q 10%**	
Highway 237 (eastbound)	4300	2800	4300
Highway 237 (westbound)	4300	2800	2500
Tasman Drive	4300	2800	4500
Highway 101	4160	2700	3600
Central Expressway	3900	2500	3500
Kifer Avenue	3900	2500	3400
SPRR	3900	2500	3500
Monroe Street	3300	2100	*
Footbridge	3300	2100	*
Footbridge	3300	2100	*
Calabazas Blvd.	3300	2100	*
Machado Avenue	3300	2100	*
Cabrillo Avenue	3300	2100	*
Warburton Avenue	3300	2100	*
Bowers Plaza Crossing	3300	2100	*
El Camino Real	3100	2000	*
Pomeroy Avenue	3100	2000	2800
Benton Street	3100	2000	*
Lawrence Expressway	3100	2000	*
Lochinvar Avenue	3000	1900	2200
Homestead Road	3000	1900	2450
Pruneridge Avenue	3000	1900	2800
Tantau Avenue	3000	1900	2300
Highway 280	3000	1900	*
Stevens Creek Boulevard— Vallco Parkway	2800	1770	*
Miller Avenue	2800	1770	1600

Existing capacity greater than Q 1%.



CALABAZAS CREEK
ONE PERCENT FLOOD MAP

FIGURE 6

Interstate 280 forms the northern border for flooding from the Miller Avenue culvert. Floodwaters would reenter the creek north of Vallco Parkway and through Junipero Serra Channel along I-280.

Extensive flooding would be caused by flows escaping from the channel at the Tantau Avenue culvert during the 1 percent event. This flow would travel northerly mixing with waters overbanking between Lawrence Expressway and Pruneridge Avenue. The combined spills would cause flooding of up to 2 feet in the residential and industrial areas on both sides of the creek.

In the study area, about 2,000 homes and over 75 industrial and commercial buildings would be flooded to depths of up to 2 feet. One percent flood damages would be approximately $35.2 million (Table 3), and average annual flood damages about $1.3 million.

SEDIMENT PROBLEMS

The most significant sediment problems occur between Highway 237 and Highway 101. The sediments come from the San Francisco Bay and the upstream watershed.

Suspended silts from San Francisco Bay are carried up the channel by tidal currents where they mix with freshwater stream flows. In this mixing zone, a chemical process occurs which causes the suspended silts to coagulate and settle along the banks where the velocities are low. The receding tide draws the water back to the Bay, eroding and transporting only a portion of its original sediment load. Over time benches at about elevation 6 are formed along the channel sides with a low flow channel in the middle. Vegetation which establishes on these benches secures them and protects them from erosion.

High volumes of fluvial sediments are also deposited in this section of Calabazas Creek. The Calabazas Creek watershed has a moderately high sediment yield which is attributed to cultural activities in the upper watershed and active channel erosion. Most of the sands and gravels are eventually deposited between Highway 101 and Guadalupe Slough.

The rate of deposition varies to as much as 10,000 to 20,000 cubic yards per year. It is conceivable that deposition during a major storm could reduce channel capacity enough to cause flooding. This may have been the case at Highway 101 in 1986.

The average annual cost of removing this material and the vegetation which grows upon it is estimated to be approximately $250,000.

No substantial sediment deposition occurs in the concrete-lined section between Highway 101 and Lawrence Expressway. Small quantities of sediment consistently deposit below the drop near the Calabazas Boulevard culvert, at the Pomeroy Avenue culvert and below the drop downstream of Lawrence Expressway. The District spends approximately $10,000 per year to maintain this section of creek.

Between Lawrence Expressway and Miller Avenue, the only significant sediment deposits occur in Reach 6 downstream of Vallco Parkway. Here the mild slope and wide channel in this reach result in low velocities. The average annual rate of deposition is estimated to be 700 cubic yards per year. The average annual cost of removing this material is estimated to be $10,000.

TABLE 3
Waterways Management Model
1 Percent Flood Damage Report

Calabazas Creek
Guadalupe Slough to Miller Avenue

	Area Flooded Acres (Acres)	Number of Buildings	Direct Structure Damage ($1,000)	Direct Content Damage ($1,000)	Indirect Damage ($1,000)	Damage to Farms and Open Land ($1,000)	Total Flood Damages ($1,000)
SF Resident	289	1204	7098	2130	1384		10612
Multi Resident	103	987	6516	1955	1271		9741
Mobile Home	0	0	0	0	0		0
Commerical	91	37	1063	2125	1116		4304
Industrial	136	39	2006	5015	3159		10179
Schools, Public	10	4	83	167	85		335
Open Improved	49	0	0	0	0	14	14
Agriculture	18	0	0	0	0	0	0
Vacant Land	138	0	0	0	0	0	0
TOTAL	834	2271	16766	11392	7015	14	35185

EROSION PROBLEMS

Most of the channel banks throughout the section of Calabazas Creek between Lawrence Expressway and Miller Avenue are unstable. Between 1978 and 1985, over $600,000 was spent on erosion repair in this section. Figure 7 shows the 31 sites and respective costs of the erosion repair and sediment removal projects. In this section, bank erosion is attributed to high flow velocities which cause scouring at the toe of the creek banks. As the undercut side slopes of the channel become saturated, large sections of the banks slough into the channel. Because of the unstable banks and unprotected trees, private properties immediately adjacent to the creek are at risk from bank failures and debris blockages. Figure 8 shows examples of erosion in Calabazas Creek.

Channel erosion further complicates the sedimentation problem. Gravel and soil particles are transported by the fast-flowing waters and deposited in areas along the creek where the water slows down. This reduces channel capacity by raising the channel bottom and making the creek shallow where it once was relatively deep.

Erosion of the channel banks has denuded numerous areas along the creek of all vegetation. The aesthetic qualities of the creek have also been degraded where the concrete rubble or rock was placed to protect the steep slopes and eroded channel banks.

LAND SUBSIDENCE EFFECTS ON FLOOD CONTROL

Land subsidence has occurred in the study area as a result of overdraft pumping of the groundwater basin. It is estimated that subsidence began about 1920. The ground level has dropped as much as 3 feet in the study area during this period. The result of land subsidence is higher water surface elevations in the creek relative to low lying lands close to the Bay. In the areas of greatest land subsidence there are few alternatives but to add floodwalls or levees to the creek to contain floodwaters.

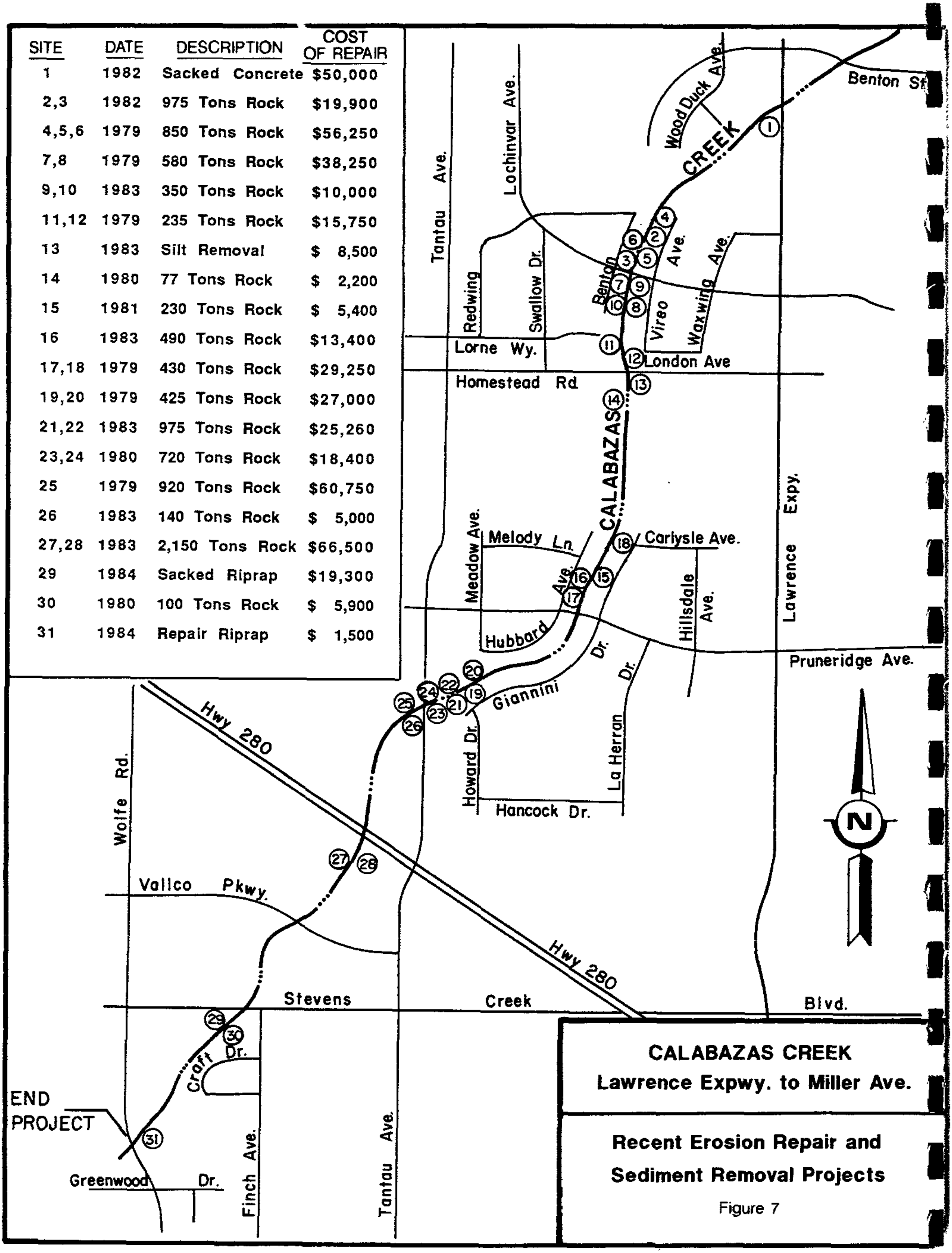
Land subsidence aggravates local drainage problems; particularly downstream of Tasman Drive. Pumping stations must be installed in order for adjacent land to drain into the creek. Existing ground elevations range from about 3.5 to 9.5 feet, NGVD. It is not uncommon for the water surface in the creek to exceed this range of elevation and cause problems for gravity drainage systems. A pumping station has been installed by the City of Sunnyvale to improve local drainage along Calabazas Creek. The City of Sunnyvale's pumping station is located about 600 feet downstream of Highway 237 and has an output capacity of about 240 cfs.

LOCAL DRAINAGE PROBLEMS

Within the context of this study, local drainage is defined as the system of gutters, storm drain inlets, storm sewers, and outfall structures that convey local surface runoff into the creek or flood control channel. The local drainage facilities are owned, operated, and maintained by the cities or property owners whose lands they drain.

There is a local drainage problem along Calabazas Creek in the downstream portion of the study area that has been aggravated by land subsidence. Ponding of water in streets has occurred in the areas east of the creek between Tasman Drive and Highway 101. The local drainage system south of Tasman Drive is designed to discharge into Calabazas Creek by gravity. The areas north of Tasman Drive do not have a problem because they are serviced by the pumping station built by the City of Sunnyvale. Upstream of Highway 101 the local drainage facilities have not been significantly affected by subsidence.

SITE	DATE	DESCRIPTION	COST OF REPAIR
1	1982	Sacked Concrete	$50,000
2,3	1982	975 Tons Rock	$19,900
4,5,6	1979	850 Tons Rock	$56,250
7,8	1979	580 Tons Rock	$38,250
9,10	1983	350 Tons Rock	$10,000
11,12	1979	235 Tons Rock	$15,750
13	1983	Silt Removal	$ 8,500
14	1980	77 Tons Rock	$ 2,200
15	1981	230 Tons Rock	$ 5,400
16	1983	490 Tons Rock	$13,400
17,18	1979	430 Tons Rock	$29,250
19,20	1979	425 Tons Rock	$27,000
21,22	1983	975 Tons Rock	$25,260
23,24	1980	720 Tons Rock	$18,400
25	1979	920 Tons Rock	$60,750
26	1983	140 Tons Rock	$ 5,000
27,28	1983	2,150 Tons Rock	$66,500
29	1984	Sacked Riprap	$19,300
30	1980	100 Tons Rock	$ 5,900
31	1984	Repair Riprap	$ 1,500

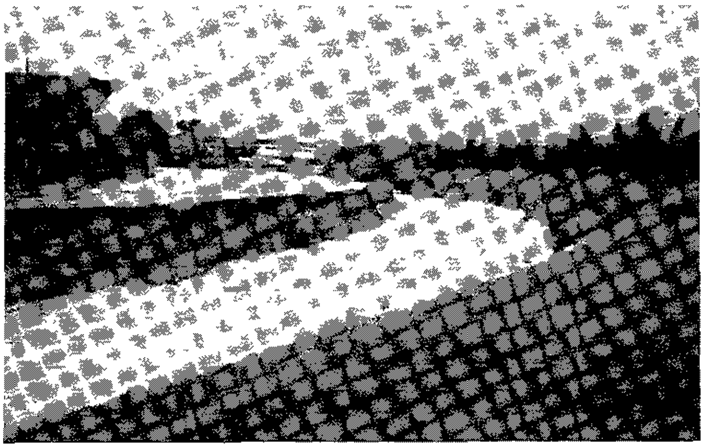


CALABAZAS CREEK
Lawrence Expwy. to Miller Ave.

Recent Erosion Repair and Sediment Removal Projects

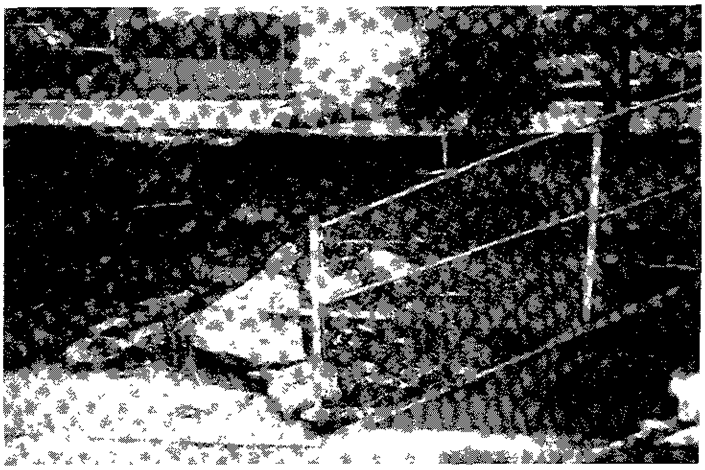
Figure 7

CALABAZAS CREEK
EROSION CONDITIONS
FIGURE 8



Looking upstream from Tantau Avenue (Reach 5). Note eroding channel bank threatening parking lot. S 1682-29

Looking downstream toward Lochinvar Avenue (Reach 2). Note eroding bank threatening riparian trees.



Looking downstream from Miller Avenue (Reach 8). Note eroding bank threatening driveway.

MAINTENANCE CONCERNS

Downstream of Highway 101, periodic maintenance involves providing channel flow capacity. The 1977 Engineer's Report specified "The plant growth in the low flow channel between Bayshore Freeway and Tasman Bridge, which is not subject to tidal inundation, will be removed by mechanical means in the fall of each year." The report also specified "The plant growth in the excavated floodplain area will be controlled to a maximum of 2 feet by mowing." A Mannings roughness coefficient of 0.035 was used for design of the existing channel. This roughness coefficient implies an earth channel with some grasses and weeds and little or no brush.

The 1977 report did not anticipate the necessity for vegetation control work in the areas subject to tidal inundation. The report stated that "Frequent inundation of these areas with brackish waters will effectively control the growth at a level that will not materially impede the streamflows in the creek."

Since its construction in 1979, the reach downstream of Highway 101 has developed several maintenance problems. As previously mentioned, this reach accumulates sediment at the rate of 10,000 to 20,000 cubic yards per year. The channel also revegetates very rapidly (fresh water and brackish water areas). Due to the width and marshy character of the channel and the height of the levees, specialized equipment is necessary to remove the sediments and vegetation as shown in Figure 9. It has proven nearly impossible to access the channel under the existing bridges to remove sediment and vegetation. The disposal of the dredged sediment is difficult because it contains a significant portion of vegetation. Typically, it must be loaded into trucks and hauled to a sanitary landfill.

The maintenance program has been restricted by regulatory agencies particularly the California Department of Fish and Game (CDFG). The CDFG is responsible for the management and preservation of riparian habitats. Often the District needs to partially remove these habitats to maintain flood control channel capacity. In the past, this issue has been negotiated annually through the CDFG permit process.

In May of 1989, a Memorandum of Understanding concerning routine maintenance activities in improved channels was adopted by the District and the CDFG (Appendix V). This agreement eliminates a regulatory barrier which in the past prevented maintenance of the channel to design capacity.

Based on past expenditures, the estimated annual cost to maintain Calabazas Creek for the entire study length is approximately $300,000.

Downstream of Highway 101, the estimated annual cost to maintain the channel to design capacity is $250,000. Historically, the District spent approximately $50,000 annually because of budget and regulatory constraints. This partial maintenance resulted in excessive sedimentation and vegetal growth which reduced the channel capacity. In 1986, the water level from a 30-year storm was within 1 foot of the top of levee downstream of Highway 101. Since that time, the maintenance program has been intensified to prevent a recurrence of that situation.

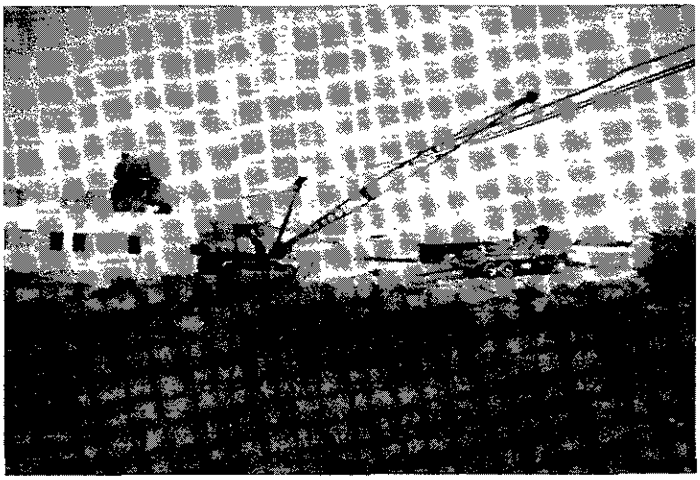
Between Highway 101 and Lawrence Expressway, the estimated annual cost to maintain the channel is $10,000. The existing channel is concrete lined and requires only incidental removal of sediment and debris. The concrete channel bottom is moderately scoured and will require restoration within a few years. The removal of sediments in this section can be complicated by poor access. In order to reach sediment locations, maintenance equipment must enter the channel bottom via access ramps and in some cases traverse drop structures.

Between Lawrence Expressway and Miller Avenue, the estimated annual cost to maintain the channel is $10,000. Periodic maintenance activities include vegetation removal, weed abatement and incidental sediment removal. Currently, maintenance activities are impeded by lack of access to the channel. The existing channel is kept free of woody growth and large reeds by work crews with hand tools. Cuttings and other miscellaneous debris must be hand carried to a disposal truck. Because of existing access problems, the haul distance may be quite far. Routine weed abatement usually requires manual application with a portable sprayer.

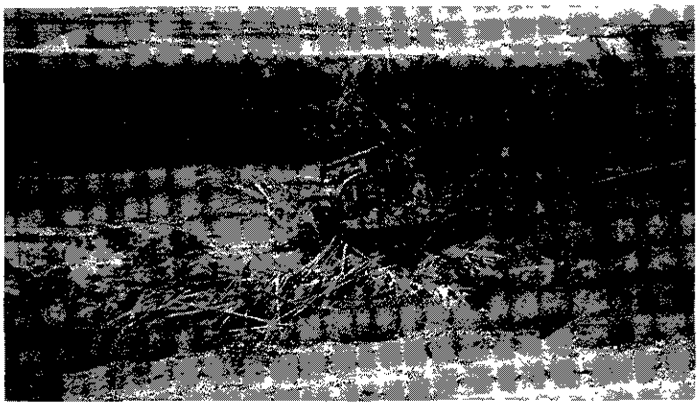
The section between Lawrence Expressway and Tantau Avenue has the greatest maintenance access problems and is not being maintained. The District has an 80-foot right of way and top of bank access for 250 feet upstream of Lawrence Expressway and 450 feet downstream of Lochinvar Avenue. The District does not have right of way or maintenance access to the intervening 960 feet.

The section between Homestead Road and Tantau has severely limited maintenance access. Wet weather access is impossible. The District has a 40-foot right of way (from top of one bank to the creek centerline) for 1,200 feet upstream of Homestead Road.

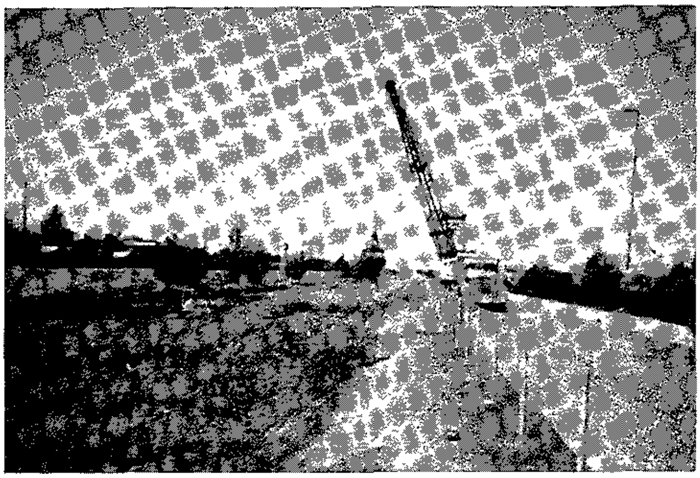
FIGURE 9



Looking westerly across Calabazas Creek, downstream of Tasman Avenue. Dragline loads dump truck with vegetation and sediment from channel. S 1866-10

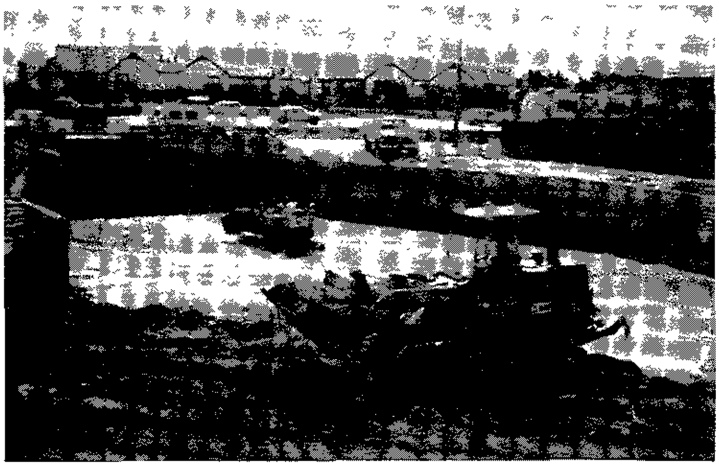


Looking westerly across Calabazas Creek, downstream of Highway 237. Dragline excavates sediment and vegetation from channel. S1846-6



Looking northerly from downstream of Highway 101. Special mud-cat bulldozer moves sediment from channel as dragline excavates. S 1884-19

FIGURE 9



Looking upstream at Highway 101 culvert. Specialized mud-cat bulldozer removes sediments from inside culvert. S 1884-18

FORMULATION OF ALTERNATIVES

This chapter describes the engineering criteria used, the alternatives studied, and the project selection process. The alternatives were specifically designed to address:

1. Leveed reaches between Guadalupe Slough and Highway 101 which were built prior to the development of FEMA levee standards and which would not meet those standards;

2. Previously improved facilities between Highway 101 and Lawrence Expressway which would not convey the current 1 percent design flood flow;

3. The reach between Lawrence Expressway and Miller Avenue which is the highest priority reach in the North Central Zone because of the magnitude of potential flood damage there.

ENGINEERING CRITERIA

The preliminary design for all the alternatives considered complies with District policy and is based on generally accepted engineering criteria for flood control projects.

Design Flow Rate

The policy of the District is that the improved channel must be capable of conveying the 1 percent (100-year) flood with freeboard. The design flow rates used for this project were obtained from the District's Hydrology Study, dated August 1977. The District's policies and methods are discussed in Appendix H. The 100-year level of protection is consistent with the policy of the Federal Emergency Management Agency (FEMA). FEMA is responsible for the administration of the National Flood Insurance Program (See Appendix G). FEMA is also responsible for the Flood Insurance Rate Maps which are the basis for determining flood insurance requirements and rates.

Table 4 shows the design flow rates in cubic feet per second (cfs) for the 1 percent and 10 percent floods in the study area. The 10 percent (10-year) flood flow is commonly used in conjunction with local storm drain design.

TABLE 4
Calabazas Creek Design Flow Rates (CFS)

	Annual Probability of Exceedance (Frequency)	
Location	1% (100-Yr.)	10% (10-Yr.)
At Sunnyvale Pump Station	4300	2800
At SPRR	3900	2500
At El Camino Real	3100	2000
At Highway 280	3000	1900

Channel Roughness

Another parameter used in the design of flood control channels is the channel roughness factor (Manning's n). Typical values used are shown in Table 5.

TABLE 5
Calabazas Creek Design Channel Roughness Factors

Channel Description	High "n" For Stage	Low "n" For Velocity
Mudflat/Tidal Marsh	.030	.025
Earth, unmaintained with woody vegetation	.120	.025
Earth, flexible vegetation	.070	.025
Earth, maintained	.035	.025
Step gabion lined	.045	.033
Gabion mattress revetment	.045	.033
Concrete lined	.015	.013

Velocity

Maximum nonerosive velocity for an earth channel could range up to about 6 feet per second. Velocities on Calabazas Creek upstream of Lawrence Expressway to Highway 280 and upstream of Stevens Creek Boulevard would greatly exceed the allowable range for earth channels. Downstream of Highway 101 velocities are much lower and the earth levees are considered hydraulically stable.

For gabions maximum velocities range up to about 15 feet per second. Velocities for the 1 percent design flow rate in the recommended gabion channel would range between 8 and 11 feet per second.

Concrete-lined channels are stable for flow velocities up to 20 feet per second.

Freeboard

The third design parameter is freeboard. The following are the District guidelines used in this study to establish minimum freeboard:

1. Existing bridges: Pressure flow is acceptable; however, the bridge must be able to withstand all lateral and uplift forces.

2. New bridges: Freeboard should be equivalent to that in the channel upstream and downstream.

3. Channels without levees: Minimum freeboard is 1 foot or, two-tenths the energy, whichever is greater.

4. Channels with earth levees: Minimum freeboard is 3 feet plus a height which varies linearly from ½ foot at the upstream end of the levee to 0 feet at the downstream end, with an additional foot within 100 feet of bridges or other constrictions.

The starting water surface elevation (12.25 NGVD) used for this project is based upon the 1 percent water surface elevation at the Guadalupe Slough. The 1 percent flood water surface elevation in Guadalupe Slough was modeled as part of this study (Appendix I).

Maintenance Access

The District's design guidelines are to provide maintenance access roads of 18 feet wide where possible. The minimum allowable width is 15 feet. Maintenance access ramps must be at least 12 feet wide with a maximum slope of 20 percent for a concrete lined ramp and 13 percent for aggregate base ramps.

ALTERNATIVES FEASIBILITY AND THEIR SIGNIFICANT IMPACTS

There are several conceivable methods for addressing the problems on Calabazas Creek within the study area. In general, different sets of solutions were considered for each of the three distinct categories of channel within the study area because the problems and constraints associated with each type of channel are different. Those approaches which were not feasible for a specific reach of Calabazas Creek were eliminated from further consideration. For example, in most reaches upstream of Lawrence Expressway, right of way limitations prohibit consideration of earth channels or modified floodplains. Placing the channel underground in buried conduits was judged prohibitively expensive, both to construct and maintain.

Construction of an upstream storage facility was first investigated for feasibility in 1956. A 5,000-acre-foot reservoir was studied for both water supply and flood control benefits. A 1970 update of this earlier study estimated a cost of $6 million and concluded that the site was not economically feasible. Since that study, much of the land required for the reservoir has been developed making this alternative infeasible.

A nonstructural alternative would solve the flooding of structures in the floodplain without channel modifications. The structures would either be floodproofed or purchased and removed. Flooding would still occur on the average of every 5 years causing disruption in services and resulting in clean up costs. Erosion would be expected to continue, requiring remediation when structures are threatened. This alternative is not considered feasible due to the high cost of floodproofing or purchasing all the structures in the floodplain, the social impact of removing homes, the continuing erosion, and the residual damages from flooding.

The following presents descriptions of the alternatives investigated for each of the three distinct categories of channel within the study area. These descriptions include a discussion of the impacts of the alternatives and their estimated total cost.

Also studied were the consequences of taking no action to solve the problems. The alternative approaches were compared considering project objectives, engineering requirements, existing constraints, effectiveness, impacts, cost and future maintenance requirements. The alternatives are summarized in Table 6 (located at the end of this chapter).

"No Project" Alternative

Under this alternative the District would not take any direct action to reduce the existing flood hazard from Calabazas Creek. Residents and businesses within the floodplain would continue to face potential hardships due to flooding. Private properties immediately adjacent to the creek would continue to be at risk from streambank failure and debris blockage.

During a 1 percent flood, damages as high as $35.2 million would occur. Over 2,000 homes and apartments and 76 commercial and industrial buildings would be inundated by floodwaters from Calabazas Creek.

On the average, some flooding could be expected to occur about once every 3 years. Average annual flood damages would be about $1.3 million. The District would continue its ongoing maintenance program of debris and sediment removal, and erosion repair. Annual maintenance costs would average about $300,000 to $400,000 per year. These costs are likely to increase significantly as sediment disposal costs increase at landfills.

Downstream of Highway 101 the maintenance program would be intensive. Significant growth of vegetation would be prohibited in the channel. Annual maintenance activities would disrupt or eliminate any habitat which developed.

Upstream of Lawrence Expressway mature trees would continue to fall into the creek and create blockages during high flows. Trees fall into the creek when the ground in which they are anchored is eroded or undermined, most often during high flows. Fallen trees can be carried downstream to a culvert where they become lodged. When other debris flowing down the creek accumulates on the tree, a blockage is created. These blockages may result in significant reductions in flow capacity and cause or aggravate flooding.

Some mature trees in danger of falling into the creek which could not be stabilized would continue to be removed. Trees which are undermined would be stabilized only where they do not encroach into the flow area of the creek.

Ongoing tree loss to erosion would not be offset by replanting.

To mitigate the financial burden of flooding, owners of existing structures in the floodplain designated by FEMA have the option of purchasing federally-subsidized flood insurance. Flood insurance is required when purchasing, with federally-backed funds, property which is located in the flood hazard areas designated by FEMA. Although structures and contents can be insured, there are significant costs associated with flooding which are not covered by flood insurance. These include the cost of emergency operations, indirect flood damages such as loss of business and damage to various public facilities. If flood insurance was purchased by all property owners in the flood hazard area, the premiums would amount to about $390,000 per year.

The leveed sections of Calabazas Creek, downstream of Highway 101, do not meet FEMA freeboard standards. In 1986 FEMA adopted a policy that, for flood insurance purposes, they would not recognize levee systems which do not meet their minimum standards. If the channel is not improved, areas including hundreds of homes and businesses may be reclassified as zones where flood insurance is required.

The total cost of the "No Project" alternative is $19.7 million. This is the sum of the present worth of average annual flood damages, average annual emergency maintenance costs, development costs which will be incurred without the project and annual flood insurance administration costs. The average annual cost of the "No Project" alternative is $1.41 million.

The "No project" alternative would impede the solution of flood problems and associated 1 percent flood damages of $9.5 million in those reaches upstream of the study limits.

Alternative Solutions—Guadalupe Slough to Highway 101 (Reaches 9-12)

1. *Flood Basins*

   The flood basin identified for this project would occupy approximately 1,000 acres of baylands currently utilized for salt production surrounding the Guadalupe Slough Channel. This alternative would include constructing levees and tide gates. The remaining salt pond system would require additional brine transport facilities.

   A flood basin would provide the ability to regulate the water surface in the basin and significantly lower the controlling water surface in Calabazas Creek and other tributaries. The tide gates would also have the effect of preventing the transport of bay sediments into the basin and its tributary stream channels. This alternative would dramatically reduce the amount of modification required to provide 1 percent flood protection on Lower Calabazas Creek and would significantly lower maintenance requirements. Generally lower water surfaces would improve local drainage and eliminate the necessity to modify some existing bridges.

   Similar benefits would be expected at the other basin tributary streams including San Tomas Aquino Creek, Sunnyvale Outfall East and Sunnyvale Outfall West. The estimated cost of this flood basin is $9 million which is principally land cost.

   Environmental impacts include the conversion of salt pond habitat into estuarine wetland habitat in the actual flood basin area. The tributary streams would evolve from a brackish water habitat to a fresh water habitat.

2. *Floodwalls*

   Under this alternative, floodwalls would be constructed on the tops of existing levees at the outside edges. The width of the existing levees would be reduced by removing 5 feet from the inboard side. This would increase the width of the channel by 10 feet. The maintenance roads on top of the levees would be a minimum of 15 feet wide. Depressed maintenance roads, 18 feet wide would be constructed at Elevation 8 feet along both levees. Ramps would need to be constructed in the vicinity of bridges to provide access over the proposed floodwalls to the maintenance roads.

   There are five bridges between Guadalupe Slough and Highway 101. These bridges would require modifications to provide 1 percent flood capacity with freeboard. The bridges for eastbound and westbound Highway 237 will be replaced by the Santa Clara County Traffic Authority. At the three remaining bridges design criteria could be satisfied by floodproofing the bridges, raising the existing bridges or replacing the bridges. Raising the bridges above the design water surface with freeboard is the ideal solution. Floodproofing is proposed because it would be substantially less expensive than the other alternatives, does not significantly increase risk of debris buildup, and would not inconvenience or decrease the safety of those who use the bridges. Should major reconstruction of one of these bridges become necessary, raising or replacing that bridge should be considered.

Floodproofing these bridges includes constructing watertight floodwalls on each face, waterproofing the bridge decks, and reinforcing the bridges to withstand hydraulic forces.

Numerous approaches for addressing the extensive maintenance requirements for the existing channel were considered including continuing the existing "clean channel" program. Maintenance reduction elements considered included tide gates to eliminate tidal sedimentation, concrete lining under bridges to permit cleaning, depressed maintenance roads to provide better access and channel section enlargement to permit reducing maintenance requirements. All of the maintenance reduction elements except tide gates are proposed. The height of floodwalls required for no maintenance would be unreasonable and the resulting increase in water surface elevation for less frequent storms would aggravate local drainage problems. Widening the channel to achieve reduced maintenance would require obtaining adjacent lands and would be prohibitively expensive. The project design includes provision for sediment deposition to over 1 foot above mean higher high tide, and for the establishment of grasses, reeds and other flexible vegetation. Upstream of Tasman Drive, vegetation would be allowed to reestablish and no clearing would be required along the west bank.

The environmental impacts associated with this alternative would include removal of most vegetation and wildlife during construction, noise and dust during construction, and the permanent visual impact of a low floodwall. This alternative would provide permanent habitat where none exists today and reduce the maintenance frequency which disrupts wetland habitat in other parts of the creek. The average available fish habitat would be decreased. Architectural treatment of floodwalls would soften their impact.

This alternative would result in generally higher water surface elevations in the channel. Flap gates would be provided at storm drain outlets to prevent reverse flow.

The cost of this alternative is $4.1 million

3. *Raised Reinforced Earth Levee*

Under this alternative, the existing levees would be partially removed and reconstructed 4 feet higher than existing elevation. A reinforcement fabric would be used to achieve a 1½ to 1 side slope. This would minimize encroachment of the reconstructed levee into the flow area. Bridges would have to be floodproofed and depressed maintenance roads constructed as in the floodwall alternative.

Environmental impacts would be similar to the floodwall alternative. This alternative would provide less habitat area than the floodwall alternative. The cost of this alternative is $3.1 million.

4. *Combination Floodwalls and Levee Raising*

This alternative evolved from Alternatives 2 and 3 and is the **recommended** alternative. Levee reinforcement and raising would be done where existing levees are of sufficient size and minimal encroachment of flow area would occur. Geotechnical investigations would need to be performed to confirm that the levee foundation materials can support the weight of levee raising. Floodwalls are an alternative where raising levees proves to be unsuitable. Floodwalls would be constructed along the west bank between Tasman Drive and

Highway 101 and along the east bank adjacent to the Mission College property. Bridge floodproofing, ramps, and depressed maintenance roads would be similar to Alternatives 2 and 3.

The cost of this alternative is $3.8 million.

Alternative Solutions—Highway 101 to Lawrence Expressway (Reaches 13-25)

1. *Clear Span Bridges at Inadequate Culverts*

   This alternative would consist of replacing the inadequate multiple celled box culverts with clear span bridges. This is the best solution hydraulically. Channel transitions and obstructions associated with box culverts are eliminated. The costs of replacing existing culverts with clear span bridges is very high particularly at Highway 101, Central Expressway, and the SPRR. Replacing all inadequate culverts with clear span bridges would cost $4.1 million.

2. *Additional Cells at Inadequate Culverts*

   This alternative would consist of adding cells to increase the capacity of the inadequate box culverts between Highway 101 and Lawrence Expressway. Hydraulic analysis indicated that additional cells would not prevent a hydraulic jump and subcritical flow upstream of the culverts at the design flow rate. The subcritical flows depths exceed the existing channel depths. With or without additional cells, floodwalls could be necessary to contain the design flow. Additional cells, therefore, provide little or no benefit and are not considered a feasible alternative.

3. *Floodwalls/Levees Upstream of Inadequate Culverts*

   This alternative would consist of constructing floodwalls along the channel upstream of the inadequate culverts. Upstream of Highway 101 there is sufficient space along the channel to construct small earth levees (which are generally less expensive than floodwalls). These floodwalls or levees would allow the water level upstream of the culverts to rise until sufficient pressure is developed to push the design flow rate through the culverts. The maximum height of floodwall required would be 5 feet which includes over 2 feet of freeboard.

   Floodwalls would also be constructed at the upstream face of the culverts. A rounded corner would be included at the soffit to improve culvert performance.

   New ramps would need to be constructed and existing ramps would have to be extended to provide access to the maintenance roads and the channel bottom.

   The floodwalls and levees would not improve local drainage problems because they would not decrease water levels. In some cases, the possibility of reverse flow would be introduced by floodwalls.

Where visible from public thoroughfares, the floodwalls would be architecturally treated to soften their visual impact.

The cost of this alternative is $2.2 million.

4. *Combined Elements*

This alternative incorporated elements from Alternatives 1 through 3 and is the **recommended** alternative.

In Reach 13 (Highway 101 to Scott Boulevard) levees would be constructed along the channel banks and a concrete floodwall at the Lakeview Drive (Highway 101) culvert. This alternative would avoid traffic impacts to Highway 101.

In Reach 15 (Central Expressway to Kifer Road) floodwalls would be constructed along the top of the channel bank and at the upstream face of the Central Expressway culvert.

A clear span bridge would replace the inadequate culvert at Kifer Road. This would eliminate the backwater caused by the existing culverts. It would improve the performance of the culverts at SPRR and lower the water surface in the El Camino Storm Drain. No floodwalls would be required upstream of Kifer or upstream of the SPRR.

In Reach 16A the El Camino Storm Drain confluence with Calabazas Creek would be relocated downstream of the SPRR via a new culvert. The existing culverts under the SPRR would be able to convey the 1 percent flow without the flow from the El Camino Storm Drain and backwater effect from the Kifer Road culverts.

In Reach 25 (Pomeroy Avenue to Benton Avenue) floodwalls would be constructed along the top of the bank and at the Pomeroy Avenue culvert entrance. The concrete inlet transition on the south side would be reconstructed to streamline flows and minimize sediment deposition in the culvert.

The impacts of this alternative would be the visual impact of the floodwalls and temporary disruption of traffic at Kifer Road.

The cost of this alternative is $2.7 million.

Alternative Solutions—Lawrence Expressway to Miller Avenue (Reaches 1-8)

1. *Culvert Enlargement with Rock-Lined Sides*

This alternative would consist of augmenting inadequate culverts and excavating a trapezoidal channel with a bottom width of approximately 30 feet and lining the side slopes with rock to prevent erosion. Access to the bottom would be provided for maintenance vehicles. All channel maintenance would be performed from the channel bottom.

In Reach 8, where the existing right of way is too narrow for a rock-lined section, stepped gabions would be used to line the channel banks.

At the five inadequate box culverts between Lawrence Expressway and Miller Avenue 1 percent flood capacity could be provided by removing the existing culverts and constructing clear span bridges or by constructing additional cells adjacent to the existing culverts. Clear span bridges can eliminate the need for channel transitions and are less susceptible to debris blockage. Box culverts are typically less expensive. A detailed study indicated that the additional cost of clear span bridges (about $100,000 per crossing) was not justified by reduced maintenance costs. For this and all other channelization alternatives, the culverts at Lochinvar, Homestead, Pruneridge and Tantau are proposed to be augmented with additional cells. Because of limited space at Miller Avenue, it will be necessary to replace that culvert with a clear span bridge. Concrete transitions would be constructed at the entrance and exits of the culvert crossing to maintain hydraulic stability.

The total area which would be impacted by construction of this alternative is the greatest among the alternatives considered. Almost all existing vegetation would be removed during construction. A revegetation program would be included to mitigate the lost vegetation. The rock-lined channel alternative would provide the least area for revegetation among the alternatives considered.

The total cost of this alternative is $10.3 million which includes $920,000 for revegetation.

2. *Culvert Enlargement with Concrete-Lined Channel*

A trapezoidal concrete-lined channel is generally used where right of way is limited or where flow velocities are high enough to cause erosion of unprotected banks. Both of these conditions exist in Reaches 1-5 and in Reach 8.

The trapezoidal concrete channel would have a bottom width of approximately 18 feet, one-to-one side slopes and a depth varying from 12 to 14 feet, eight of which would be concrete-lined. In Reaches 1-5, 15 feet would be utilized along one bank for a maintenance road. This would allow approximately 8 to 15 feet on the opposite bank to remain undisturbed, thus preserving existing vegetation within that area. Due to the restricted right of way, no undisturbed area would exist in Reach 8. The culverts would be replaced or augmented as in Alternative 1. A concrete-lined channel is the least expensive alternative to construct and maintain (Table 6). The environmental impacts would include loss of groundwater recharge capacity of 1,300 acre-feet per year, loss of vegetation in the channel and maintenance road areas, and the visual impact of concrete lining. A revegetation program would be part of the project. The loss of groundwater recharge would be mitigated by providing alternative capacity elsewhere at a minimum cost of $1.3 million. The total cost of this alternative is $9.8 million.

3. *Culvert Enlargement with Mattress Gabion Channel Lining*

This alternative would consist of excavating a trapezoidal channel with a bottom width of approximately 30 feet and lining the side slopes with mattress gabions up to or above the 2 percent flood water surface to increase capacity and prevent erosion. The culverts would be replaced or augmented as in Alternative 1. Maintenance access would be provided along the channel bottom.

Excavation of the channel in preparation for placement of gabions would require removal of much of the existing vegetation. However, by placing earth over the gabions, grasses and nonwoody plants would be able to naturally revegetate within the channel. Planting spaces could be provided near the top of the gabion lining to allow planting of a limited amount of vegetation.

The total cost of this alternative would be $8.3 million.

4. *Culvert Enlargement with Combination Stepped and Mattress Gabion Channel Lining*

This alternative evolved from Alternative 3 and is the **recommended** alternative. For this alternative, stepped gabions would be used in certain sections and much more existing vegetation would be preserved. Stepped gabions can be placed on a variety of side slopes and include openings in the lining to accommodate existing trees. The greater variety of permissible side slopes allows a narrower and more flexible channel configuration. Stepped gabions are proposed where mature trees could be avoided or accommodated in the lining. In Reach 1, this alternative includes a short high flow bypass channel which would allow some of the existing creek to remain undisturbed by construction. In Reach 3, it is proposed to construct approximately 1,200 feet of extra wide channel and dedicate a corridor for permanent in-stream habitat. This alternative would reduce tree loss to 49 percent, as opposed to 95 percent for Alternative 3.

The estimated cost of this alternative is $10 million. Stepped gabions require greater volumes of rock and are consequently more expensive than mattress gabions. To provide for the bypass and the extra wide channel, slightly more than one acre would need to be acquired.

Culverts would be replaced or augmented as described in Alternative 1. Fourteen access ramps are proposed to provide for maintenance of the channel from the bottom.

5. *Culvert Enlargement and Essential Channel Improvements*

One suggested variation of Alternative 4 is to enlarge all inadequate culverts and to make initial capital improvements only where the existing channel is inadequate or is severely eroded. About 3,700 feet (40 percent) of the existing channel length is currently too small to carry the design flood. There is an additional 3,100 feet of channel which is severely eroded and will require immediate stabilization to protect property. With the exception of Reaches 6 and 7, only two small reaches totaling about 1,250 feet are adequate and not currently experiencing severe erosion. Soil types found in these reaches are considered susceptible to erosion at expected flow velocities. The stream banks in these reaches are expected to fail eventually.

A project similar to that proposed in Alternative 4, but with no channel work in the two short reaches which are adequate and not severely eroded, would not provide complete 1 percent flood protection because any unarmored channel banks in this reach must be considered unstable and subject to failure. Ultimately, after bank failures possibly damaging adjacent properties occur, these banks will require protection. Unit costs and overhead for several small jobs will be higher than if the work were performed on a large scale as part of a capital improvement project. Providing 1 percent flood protection by addressing only immediate problems now and completing the work after additional problems occur would ultimately be more costly ($130,000 additional) than performing the work now. In the interim, the threat to adjacent properties would continue. The cost of this alternative including the initial construction and the present worth of anticipated future repairs is $9 million.

Not providing complete bank protection would also have certain negative environmental consequences and decrease the reliability of the channel system. Mature trees would continue to be lost during bank failures. These losses would be unmitigated. Large trees which fall into the creek can become lodged and create blockages at culverts during high flows.

Impacts and revegetation measures for the parts of the channel which would be lined would be similar to those in the previous alternative.

Summary of Alternatives

The alternatives are summarized in Table 6.

Project Selection

Guadalupe Slough to Highway 101 (Reaches 9-12)

The preferred alternative (4) and recommended plan is a combination of both floodwalls and raised levees. Because of their higher cost and aesthetic disadvantages, the use of floodwalls is restricted to those areas where raising levees is not practical.

Because the construction of depressed maintenance roads result in loss of wetland area, their construction is restricted to Reaches 10 and 11 where wetland loss is unavoidable. Mitigation for this unavoidable loss will take place along the east side of Reach 9 and adjacent San Tomas Aquino Creek. Here the existing levee will be reconstructed with a smaller footprint providing an area for revegetation which is equal to the area of wetlands lost.

Highway 101 to Lawrence Expressway (Reaches 13-25)

The preferred alternative (4) and recommended plan is a combination of levees, floodwalls and other design elements. Elements which best addressed the problems of each specific site were selected.

Lawrence Expressway to Miller Avenue (Reaches 1-8)

The preferred alternative (4) and recommended plan is a combination of stepped and mattress gabion channel lining. Although a concrete channel would be the least expensive to construct and maintain, estimated costs of mitigating lost groundwater recharge potential make the total project cost about equal to the cost of a gabion-lined channel. The concrete-lined channel was generally disliked by the community and the concerned regulatory agencies. A rock or mattress gabion-lined channel would occupy almost all of the available right of way, thereby limiting areas available for revegetation and requiring removal of most of the trees. The preferred alternative (4) was developed with input from the community and concerned regulatory agencies. This alternative will solve the existing problems with the least impacts and provides for extensive revegetation.

Flood damage reduction Alternatives 1-3 were presented at a public meeting in May 1986. The community displayed strong support for a flood control effort on Calabazas Creek. A preference for gabion channel lining over concrete channel lining was also indicated. Some community members expressed concern about the impacts of tree removal associated with the mattress gabion alternative in Reaches 2, 3 and 4. In response to the communities concerns, the mattress gabion plan (Alternative 3) was modified to include more expensive stepped gabions and save trees where possible. This mixed gabion project was presented to a committee of regulatory agency representatives. These agencies cited impacts to in-stream habitat which would be unmitigated by the proposed stream bank revegetation. They suggested that these impacts could impede the acquisition of the necessary permit from the U. S. Army Corps of Engineers under Section 404 of the Clean Water Act. In response to the concerns of the regulatory agencies, the project was modified again to include a bypass channel in Reach 1 and an extra wide channel with an unmaintained corridor in Reach 3. These modifications to the original mattress gabion plan are included in Alternative 4.

The modified mixed gabion plan was presented at a public map review. Response to the project varied. In general, there was concern regarding the size of the proposed channel and the impacts its construction would have on the existing vegetation. Measures which were included in the project to avoid existing vegetation where possible and to revegetate the channel after construction were favored by most in attendance. No changes to the project resulted from comments received at the map review.

In response to concerns expressed by a few property owners about the loss of some oak trees in Reach 2, additional alternatives were investigated whereby the trees might be spared. A vertical walled concrete channel alternative was developed which would satisfy design criteria and not impact six of the eleven trees. This plan was included in the draft report and referred to as Reach 2 Alternative A. This plan is not recommended for the following reasons:

1. Higher cost
2. Prohibits revegetation of streambank
3. Poses safety hazard
4. Eliminates recharge
5. Aesthetically inferior
6. Uniform support for this plan has not been demonstrated

TABLE 6
Summary of Alternatives

#	Alternative	Description	Flooding	Erosion/ Sediment	Maintenance Program/Issues	Adverse Impacts	Remarks	Total Cost ($ Million)
	No project	No structural measures taken to reduce current risk of flooding. No change in existing flood hazard.	1% flood damages $35 million.	Bank failures threatening property will continue. Tree loss due to bank failure will continue.	Existing maintenance program would continue. Access problems remain. $300K+ annual maintenance.	No structural impacts, no decrease in flood insurance cost. Does not solve upstream flooding, continued tree loss.	Does not solve problem. FEMA insurance continues.	19.7[1]

GUADALUPE SLOUGH TO HIGHWAY 101

#	Alternative	Description	Flooding	Erosion/ Sediment	Maintenance Program/Issues	Adverse Impacts	Remarks	Total Cost ($ Million)
1	Flood basin	Construct 1000 acre flood basin at salt ponds. Raised levees upstream of Tasman Drive.	Protection to the 1% flood.	Significant reduction in deposition rate.	Reduced channel maintenance required. Additional flood basin maintenance necessary.	Delays solution of upstream problems. Major alteration of existing habitat. Impact to salt operation.	Improves some local drainage. Could benefit other NC zone creeks.	9.0
2	Floodwalls	3′ floodwalls on levees. Reduce levee width. 18′ depressed roads. 35′ low flow channel floodproof bridges.	Protection to the 1% flood.	Designed to allow deposition to equilibrium level in tidal areas.	Reduced vegetation and sediment removal. Ramps and depressed roads improve efficiency.	Habitat loss same as routine maintenance. Visual impact of floodwalls on high levees.	Lower water surface than raised levee most habitat area.	4.1
3	Raise levees	Reinforced Levees 4′ above existing levees. Minimum top width 15′. 15-18′ depressed roads. 30-35′ low flow/tidal channel floodproof bridges.	Protection to the 1% flood.	Designed to allow deposition to equilibrium level in tidal areas.	Reduced vegetation and sediment removal. Ramps and intermittent depressed roads improve efficiency.	Higher water aggravates drainage problems. Habitat loss same as routine maintenance. Visual impact of higher levees.	Least costly. Highest water surface. Least area for habitat.	3.2
4[2]	Combined floodwalls and raised levees	Reinforced levees 4′ above existing levees G. slough to Mission College E. bank, slough to Tasman W. bank then floodwalls to 101, minimum top width 15′, intermittent 15′ depressed roads, 35′ low flow channel, floodproof bridges.	Protection to the 1% flood.	Designed to allow deposition to equilibrium level in tidal areas.	Reduced vegetation & sediment removal. Ramps and intermitent depressed roads improve efficiency.	Higher water aggravates drainage problems. Habitat loss same as routine maintenance. Visual impact of higher levees.		3.8

---

[1] Sum of the present worth of average annual flood damages, flood insurance administration costs, extraordinary maintenance costs, and development cost savings.
[2] Recommended Plan.

TABLE 6 (continued)
Summary of Alternatives
HIGHWAY 101 TO LAWRENCE EXPRESSWAY

#	Alternative	Description	Flooding	Erosion/ Sediment	Maintenance Program/Issues	Adverse Impacts	Remarks	Total Cost ($ Million)
1	Clearspan bridges	Clearspan bridges at Hwy 101, Central Expressway, Kifer Road, SPRR, and Pomeroy Avenue.	Protection to the 1% flood.	Lower velocities reduce abrasion.	Minimal maintenance required.	Traffic disrupted.	High cost. Improve local drainage. Uniform flow in channel.	4.1
2	Add cells to existing culverts	Add culvert cells and floodwalls at Hwy 101, Central Expressway, Kifer Road, SPRR, & Pomeroy Avenue.	Protection to the 1% flood.		Potential for debris blockage at culverts.	Traffic disrupted.	No advantage. Floodwalls would still be required.	N/A
3	Floodwalls upstream of existing culverts	Floodwalls upstream of Hwy 101, Central Expressway, Kifer Road, SPRR, and Pomery Avenue.	Protection to the 1% flood.		Potential for debris blockage at culverts. Maintenance of floodwalls.	For infrequent storm events higher water may impede local drainage at all culverts & El Camino drain.	Lowest cost.	2.2
4[3]	Combination	Floodwalls upstream of Hwy 101, Central Expressway, Pomeroy Avenue. Clear span bridge at Kifer Road. Relocate El Camino Storm Drain downstream of SPRR.	Protection to the 1% flood.		Potential for debris blockage at culverts. Maintenance of floodwalls.	Traffic disrupted at Kifer only. Higher water surface U/S 101, Central and Pomeroy.		2.7

---

[3] Recommended Plan.

TABLE 6 (continued)
Summary of Alternatives
LAWRENCE EXPRESSWAY TO MILLER AVENUE

#	Alternative	Description	Flooding	Erosion/ Sediment	Maintenance Program/Issues	Adverse Impacts	Remarks	Total Cost ($ Million)
1	Culvert enlargement rock lined channel	Add cells to inadequate culverts, construct clear span bridge at Miller, rock lining on channel bottom and banks.	Protection to the 100 year flood.	Stable channel.	Access to channel provided.	95% tree loss. Traffic disrupted.	Revegetation cost $570000.	10.3
2	Culvert enlargement concrete lined channel	Add cells to inadequate culverts, construct clear span bridge at Miller, trapezoidal concrete lined channel.	Protection to the 100 year flood.	Stable channel.	Minimal maintenance access to channel provided.	50% tree loss, loss of recharge potential, inferior aesthetically, loss of instream habitat. Traffic disrupted.	Most stable; revegetation cost $680000; recharge mitigation cost $1300000.	9.8
3	Culvert enlargement with mattress gabions	Add cells to inadequate culverts, construct clear span bridge at Miller, mattress gabions on bank, earth channel bottom with stabilizers.	Protection to the 100 year flood.	Stable channel min. Local scour in bottom.	Periodic gabion repair required. Clearing required every other year. Access to channel provided.	95% tree loss. Traffic disrupted.	Revegetation & mitigation $570000.	8.3
4[4]	Culvert enlargement mixed stepped and mattress gabions	Add cells to inadequate culverts, construct clear span bridge at Miller, some stepped gabion sections to avoid trees. Reach 1B bypass.	Protection to the 100 year flood.	Stable channel min. Local scour in bottom.	Periodic gabion repair required. Clearing required every other year. Access to channel provided.	49% tree loss. Traffic disrupted.	Best suited to community desires; revegetation cost $370000.	10
5	Culvert enlargement with essential channel work only	Add cells to existing culverts. Enlarge channel and provide gabion lining as necessary for 1% capacity or severe erosion, reach 1B bypass.	Protection to the 100 year flood.	Partial bank stabilization. Some bank erosion would continue.	Emergency maintenance required. Access problems remain.	Banks not stabilized throughout the project reach 45% tree loss from projection. Continued erosion and tree loss. Traffic disrupted.	Best suited to community desires; does not solve long-term erosion problem.	9

---

[4] Recommended Plan.

DESCRIPTION OF THE RECOMMENDED PROJECT

This chapter presents a detailed reach by reach description of the recommended flood control project. Reaches 9-12 are located between Guadalupe Slough and Highway 101. Reaches 13-25 are located between Highway 101 and Lawrence Expressway. Reaches 1-8 are located between Lawrence Expressway and Miller Avenue. An overview of the Reach locations is shown on Sheet 2 of the Plates located at the end of this report. Descriptions of each reach, the adjacent land uses, available right of way and project measures are included. The recommended measures will stabilize the channel banks and provide 1 percent flow capacity throughout the project.

The project includes raising existing levees and constructing maintenance roads between the Guadalupe Slough and Tasman Drive. Bridges at Moffett Park Drive, Old Mountain View-Alviso Road and Tasman Drive would be floodproofed. Access ramps are proposed at all bridges.

Upstream of Tasman Drive a floodwall is proposed on the west bank. On the east bank a raised levee is proposed between Tasman Drive and the Mission College property. A floodwall would be built on the east bank adjacent to the Mission College property.

From Highway 101, low levees are proposed for about 1,500 feet upstream. Concrete lining would be extended from the existing channel up the inboard side of the levee. Concrete floodwalls are proposed upstream of Central Expressway and Pomeroy Avenue.

A clear span bridge is proposed to replace the existing box culverts at Kifer Road.

The project includes placing a new parallel box culvert under the Southern Pacific railroad tracks to relocate the El Camino Storm Drain Confluence from upstream to downstream of the existing SPRR culvert on Calabazas Creek.

Upstream of Lawrence Expressway, the proposed project consists of channel and culvert modifications. The proposed channel modifications include a short gabion-lined bypass channel through the agricultural land downstream of Lochinvar Avenue and lining the banks with gabion baskets up to or above the 2 percent water surface in the remaining reaches. Reaches 6 and 7, which were constructed in 1978 as part of the Vallco Fashion Plaza are operating efficiently and no work is proposed as part of this project. Inadequate culverts at Lochinvar Avenue, Homestead Road, Pruneridge Avenue, and Tantau Avenue would be improved by constructing additional cells. The culvert at Miller Avenue would be removed and replaced with a clear span bridge.

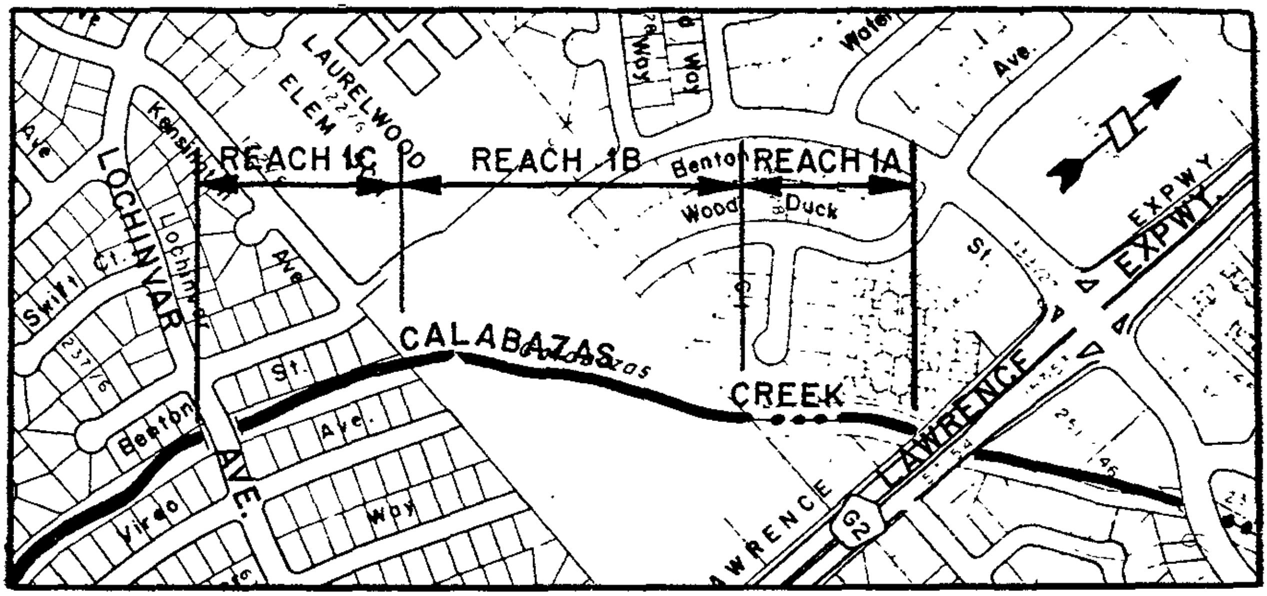
The proposed project includes planting and monitoring of thousands of trees and shrubs. The revegetation program is designed to reestablish the plant and wildlife habitat disturbed by construction, to soften the visual impacts of the proposed flood control channel and to restore elements of the riparian environment.

Any utility relocations and road construction required as part of this project would be closely coordinated with the appropriate city and/or other responsible agencies and would be done at District expense except where previous agreements or permits exist to the contrary. Outfalls of storm drain systems adversely affected by the project would be fitted with flap gates.

There is a possibility of encountering contaminated groundwater or soils during construction. There are several known contamination sites near Calabazas Creek within the study area. Those locations are mentioned in the reach descriptions and identified in Appendix U. A management plan has been developed to minimize the effects of construction on the existing contamination and to assure compliance with all State and Federal laws (see Appendix U).

Upon completion of this flood control project, adjacent areas would be completely removed from the threat of flooding from a 1 percent flood or from lesser magnitude flood events.

The measures recommended for each reach of Calabazas Creek are described in detail on the following pages and shown on the plates located at the end of this report. Each discussion includes a map of the individual reach and typical sections that depict the proposed measures.



REACH 1: Upstream of Lawrence Expressway to Upstream of Lochinvar Avenue

Reach 1 includes three subreaches. Reach 1A extends from Lawrence Expressway to 425 feet upstream. The majority of the existing excavated earth channel is lined with either sacked concrete or concrete rubble. Adjacent land uses in Reach 1A are primarily residential. The existing right of way is 80 feet wide and is fenced on both sides.

Reach 1B extends from 425 feet upstream of Lawrence Expressway to a point 1,385 feet upstream of Lawrence Expressway for a length of 960 feet. The existing channel is unimproved, heavily vegetated, occasionally choked by vegetation and snags and experiencing intermittent bank failure. Adjacent land use on both sides of the channel is agricultural.

Reach 1C extends from 1,385 feet upstream of Lawrence Expressway to upstream of Lochinvar Avenue, for a total length of 575 feet. The majority of the existing excavated earth channel is lined with rock. In several locations rock has moved down the bank. The channel bottom is covered with rock which presumably once lined the banks. Adjacent land uses in Reach 1C are residential. The existing right of way is 80 feet wide and is fenced on both sides.

There are known soil contamination sites in the vicinity of this Reach. Appendix U provides information about these sites and a management plan.

Proposed Measures

The recommended project includes regrading the existing excavated earth channel, removing sacked concrete, rock and concrete rubble, providing gabion lining, constructing access ramps, and constructing additional concrete culverts under Lochinvar Avenue. Construction of a gabion-lined bypass channel is proposed to minimize impacts to a natural section of channel. These measures will provide 1 percent flood flow capacity, channel stability, and improved maintenance access. Planting of hundreds of native riparian trees and shrubs is proposed along the upper banks.

Reach 1A

The recommended channel would be aligned within the right of way and the banks would be lined with stepped gabions in such a way as to accommodate existing native trees along the east bank as shown in Typical Section A. Plantings of native riparian species would be made in the upper four gabion courses, earth slopes and flat areas along the channel margins within the right of way.

A concrete maintenance ramp would be constructed immediately upstream of Lawrence Expressway. The concrete transition at Lawrence Expressway would be reconstructed to conform to the modified channel.

Reach 1B

A bypass channel is proposed for this reach. The high flow bypass channel would be aligned parallel to the west bank of the existing channel for approximately 750 feet as shown in Typical Section B. A diversion structure would be constructed at the upstream end. At the diversion, low flows would be directed into the natural channel to help maintain its natural character. During flooding events, high flows would be channeled through the bypass.

Plantings of native riparian species would be made in the upper four courses of stepped gabions, the upper two courses of mattress gabions, in earth slopes and flat areas along the channel margins within the right of way. The proposed project would also include concrete access ramps on the west bank 700 feet upstream of Lawrence Expressway and on the west bank 1,500 feet upstream of Lawrence Expressway. Fencing would be installed along the right of way. Locking gates would be provided in the fences at the access ramps.

A right of way varying in width from 80 to 178 feet would be acquired to implement this project in Reach 1B. This would include approximately 1.5 acres of creek and 1.1 acres of flat land. Development of this property may facilitate right of way acquisition through City and District dedication procedures.

The existing 6-inch irrigation pipe which crosses over the channel at the south end of Reach 1B would be relocated under the channel as part of this project.

Reach 1C

The proposed mattress gabion channel would be aligned within the existing right of way as shown in Typical Section C. Planting of native riparian species would be made in the upper two gabion courses, in earth slopes and flat areas along the channel margins within the right of way.

A concrete maintenance ramp would be constructed immediately downstream of Lochinvar Avenue to provide continuous access throughout Reach 1.

The existing double 12- by 9-foot reinforced concrete culvert (RCB) at Lochinvar would be augmented by constructing an additional 12- by 10-foot RCB on each side. Existing utilities would be relocated at District cost unless by a previous agreement, the owner is responsible for those costs. Proposed culvert modifications are shown in Typical Section D. An 80-foot wide easement will be acquired across Lochinvar Avenue.

Vegetation and Wildlife (Reach 1A)

This reach of Calabazas Creek is relatively disturbed. The creek banks nearest Lawrence Expressway are lined with sacked concrete, and concrete rubble from previous bank improvement projects is strewn along the channel. The vegetation is primarily limited to weedy herbaceous growth in the channel. The predominant species include barnyard grass, Bermuda grass, knotweed, and horsetail. On the upper slopes and landward margins of the banks, the vegetation consists of annual dry-land grasses and herbaceous plants such as fescue and star thistle. At the time of the field survey (Fall 1985), a single elderberry shrub was found at the top of the southern bank. In general, the vegetation cover in this reach is extremely sparse with no mature standing trees or clumps of riparian shrubs present on the banks.

The low overall cover, lack of extensive riparian vegetation or mature trees make this area poor wildlife habitat. Wildlife species observed in this reach include mourning dove, house finch, killdeer, black phoebe, and European starling.

Impacts (Reach 1A)

Vegetation likely to be removed from this reach is limited to some herbaceous vegetation along the banks and streambed. The construction of gabions and concrete channel linings and access ramps will impart a man-made appearance to the channel.

Vegetation and Wildlife (Reach 1B)

The density and variety of vegetation, and the notable absence of many nonnative plants make this reach typical of a natural riparian environment. Along the margins of the creek, mature and sapling coast live oaks are found. A single mature valley oak that has had its root crown exposed by erosion marks the southerly end of Reach 1B. Several blue elderberry trees exceeding 15 feet in height and spreading 20 feet or more in diameter grow in association with buckeye and black walnut.

Much of the northern bank is steep-sided and trees in this area often have undercut and exposed roots. The southern portion of this subreach is more gradual in slope for most of its length. Bank vegetation is dominated by mixed clumps of arroyo, smooth willow, and occasional individuals of weeping willow. The willows alternate with shorter thickets of coyote brush and poison oak. The channel bed is intermittently vegetated with scattered clumps of shrubby willows.

The structural complexity and high species diversity of the vegetation in this reach make it excellent wildlife habitat. The locked gate and the adjacent orchard enhance the value of this wildlife resource by minimizing both human and domestic animal disturbance. On the shrub-lined banks of the creek, brown towhees, white-crowned sparrows, and Bewick's wrens have been observed. Bushtit, yellow-rumped warbler, orange-crowned warbler, chestnut-backed chickadee, Anna's hummingbird forage in willow, elderberry and oak trees. In the mud of the creek bottom, evidence of raccoon activity was observed.

The mature oaks, buckeyes and walnut trees, and large elderberry plants located along the margins of the creek provide important wildlife habitat. Foraging, nesting, cover and roosting habitat for scrub jay, woodpecker, fox squirrel, and various other resident and migratory species is provided. Willows, coyote brush, and poison oak along the banks of the creek are also useful habitat because they provide cover and food to ground-foraging birds.

Impacts (Reach 1B)

Construction of a gabion-lined bypass channel is proposed to minimize impacts to a natural section of channel. The bypass would avoid impacts to approximately ½ of the relatively undisturbed habitat in this Reach.

Trees likely to be removed include one elderberry and one coast live oak on the east bank. Thickets of blackberry, arroyo willow, weeping willow and smooth willow, some coyote brush, and poison oak on the east bank will be removed. In the proposed bypass section, orchard trees and one walnut tree will likely be removed. A total of 31 trees are likely to be removed.

Vegetation and Wildlife (Reach 1C)

This section of Calabazas Creek is bordered by houses and the vegetation flanking this reach is predominantly composed of landscaped plants. The herbaceous vegetation on the banks consists of horsetail and blackberry, and some weedy species such as tumbleweed which are commonly found on drier sites above the influence of the creek. A stand of pine trees grows on the northern bank of the channel, but for the most part the road and streambank are nearly barren of vegetation. Near Lochinvar Avenue the banks are concrete-lined and the in-stream channel is cluttered with concrete rubble from past bank repair projects.

The channel vegetation which grows between channel clearings consists of such species as mule fat, willow, and several weedy species which commonly grow on disturbed soils. These include anise, cocklebur, and Bermuda grass. Cattails colonize areas of standing water, and willows occur along the margins of these wet sites. Continuous stands of sandbar willow develop within this subreach.

The most important wildlife resource of this reach is the streambed vegetation of willows and cattails. These provide cover and nesting habitat for such species as song sparrow and Bewick's wren. The pine trees along the periphery of this area also offer roosting and nesting habitat for ruby-crowned kinglet, scrub jay, chestnut-backed chickadee, and bushtit.

Impacts (Reach 1C)

No trees would be removed by the recommended project. In-stream vegetation would be removed during construction as has occurred with past maintenance activities. Temporary impacts on resident and transient wildlife will be caused by the removal of riparian forest.

The removal of vegetation and the construction of gabion and concrete channel linings and access ramps will impart a man-made appearance to the channel.

There will be traffic impacts on Lochinvar Avenue during the installation of two additional box culverts.

Mitigation (Reaches 1A, 1B, 1C)

A Mitigation and Monitoring Plan has been developed for impacts to riparian habitat. Replacement riparian habitat will be installed to compensate for construction impacts.

The revegetation plan provides for the planting and establishment of 150 trees and 474 shrubs/ground covers in this reach. Planting will be done only within the upper gabion courses and along the top of banks above the gabion lining as shown in Figure 10 in the chapter titled Significant Environmental Impacts and Proposed Mitigation Measures. Plantings will be irrigated until they establish. Native riparian plant species were selected for their habitat value and aesthetic appeal. Details of the revegetation plan and the plant list are included in Appendix S.

The gabions will be covered with soil to minimize the structural appearance of the modified channel. The revegetation program has also been designed to produce vegetation which will eventually soften and screen the artificial appearance of the modified channel. In areas where concrete is visible to traffic or neighboring properties, it will be architecturally treated to minimize the visual impact.

Prior to construction, a traffic plan will be developed to minimize disruption to traffic and insure proper safety precautions.

Monitoring

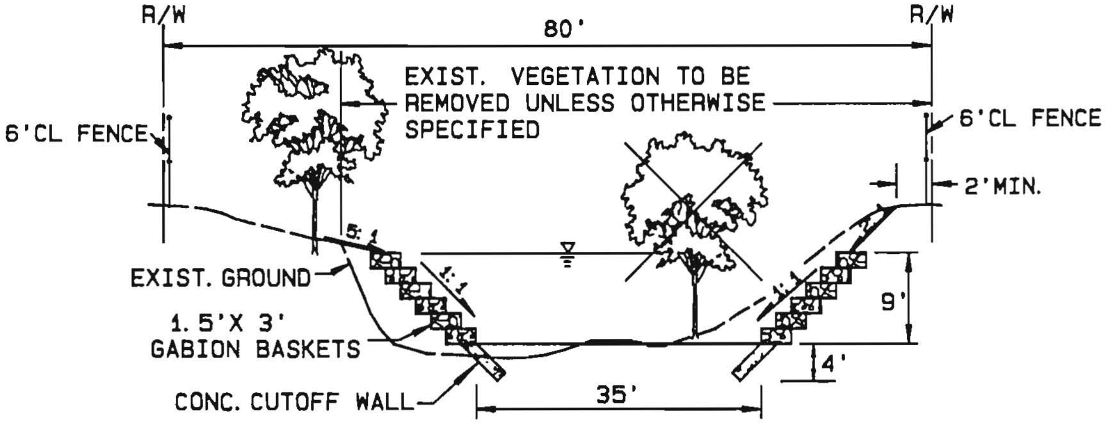
Detailed plans and specifications for mitigation measures will be developed by the District. District inspectors would oversee implementation to insure conformance to specifications. Survival of vegetation materials and other parameters of success will be monitored. A montoring program is included in Appendix S.

Costs

The total estimated project cost in Reach 1 is $2,494,410. A detailed cost estimate is included in Appendix F.

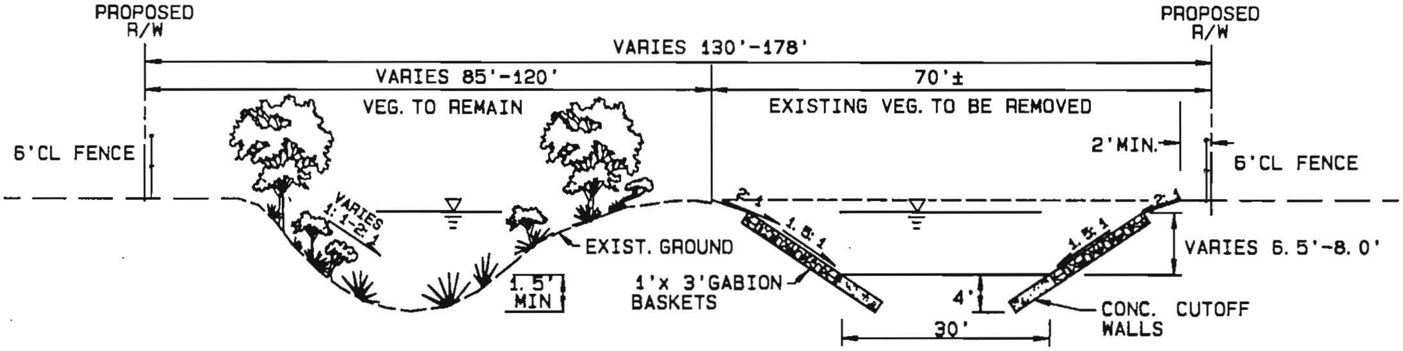
TYPICAL SECTION A
Calabazas Creek
(Station 290+75 to Station 294+85)

REACH 1A: Lawrence Expressway to 425 Feet Upstream



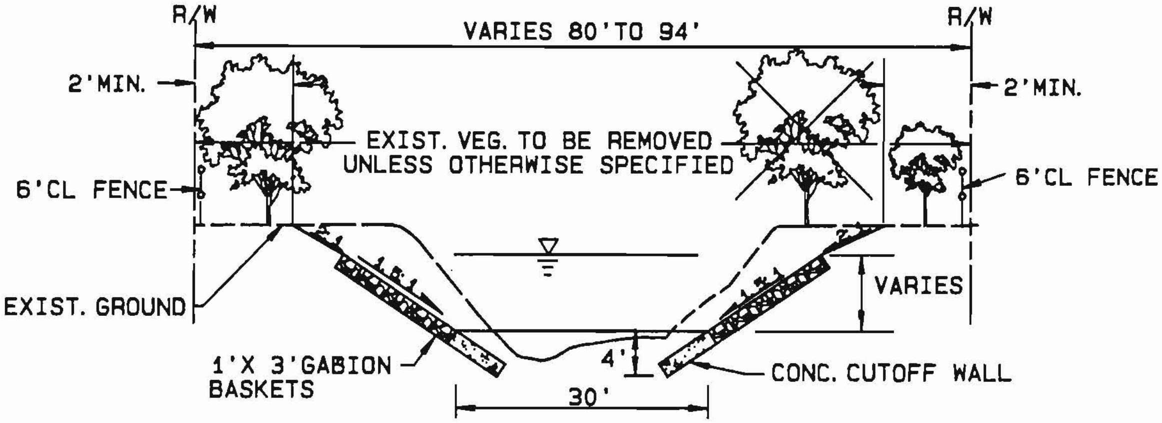
TYPICAL SECTION B
Calabazas Creek
(Station 297+00 to Station 300+65)

REACH 1B: 425 Feet to 1,375 Feet Upstream of Lawrence Expressway



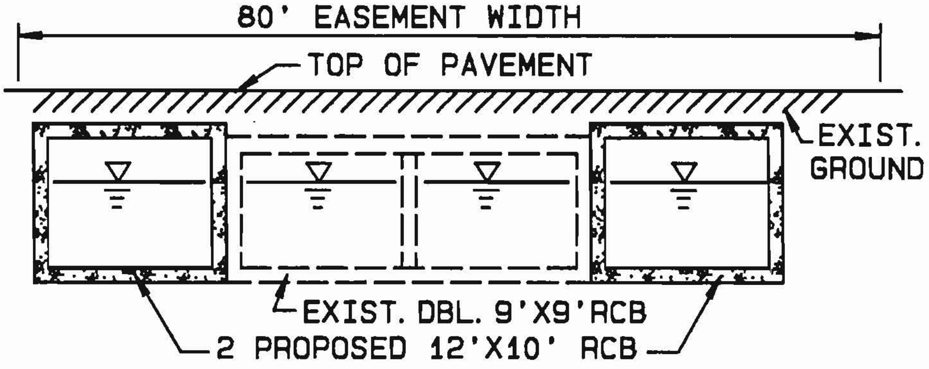
TYPICAL SECTION C
Calabazas Creek
(Station 302+50 to Station 306+20)

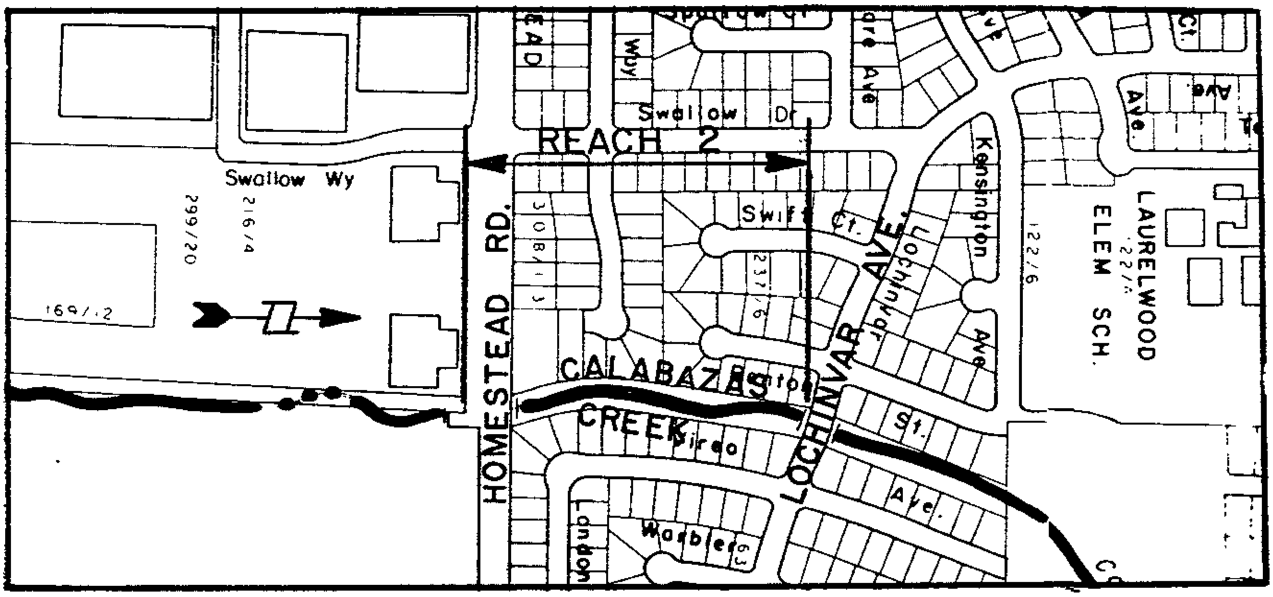
REACH 1C: 1,375 Feet Upstream of Lawrence Expressway to Upstream of Lochinvar Avenue



TYPICAL SECTION D
Calabazas Creek
Lochinvar Avenue Culverts

REACH 1C: 1,375 Feet Upstream of Lawrence Expressway to Upstream of Lochinvar Avenue





REACH 2: Upstream of Lochinvar Avenue to Upstream of Homestead Road

Reach 2 extends from upstream of Lochinvar Avenue to Homestead Road for a total length of 906 feet. The existing excavated earth channel has been intermittently repaired with rock riprap. Some of that rock has been moved off the bank to the channel bottom. Adjacent land uses are residential. The existing right of way varies from 57 to 94 feet wide and with the exception of about 200 feet, is fenced on both sides. This reach contains easements which were previously acquired to accommodate construction activities. Upon completion of the proposed project these easements will be quit claimed to the underlying property owners. There are known soil contamination sites in the vicinity of this reach. Appendix U provides information about those sites and a management plan.

Proposed Measures

The proposed project consists of enlarging the earth channel and providing mattress and stepped gabion channel bank lining, constructing concrete access ramps and constructing additional concrete culverts under Homestead Road. These measures would provide 1 percent flood flow capacity, channel stability and improved maintenance access. Acquisition of 0.10 acres of private property would be required to accommodate the proposed project. Planting of native riparian trees and shrubs is proposed along the upper banks.

Typical Sections E and F show the mattress and stepped gabion channels proposed for this reach.

Concrete maintenance ramps would be constructed upstream of Lochinvar Avenue and downstream of Homestead Road to provide continuous access throughout this reach. Fencing would be installed along the right of way in areas which are currently unfenced. Locking gates would be installed at the access ramps.

The existing double 9- by 9-foot RCB at Homestead Road would be augmented by constructing an additional 9- by 10-foot RCB on each side. Existing utilities would be relocated at District cost unless by a previous agreement the owner is responsible for those costs. The proposed culvert modifications are shown in Typical Section G and will require an 80-foot right of way acquisition under Homestead Road.

Vegetation and Wildlife

Reach 2 is similar to Subreach 1C in that maintenance roads border both sides of the creek and concrete rubble in the channel, but it is less degraded than Reach 1C. The channel is densely vegetated by herbaceous plants and the banks have considerable shrub cover. Tree cover is relatively sparse, except for a stand of 11 mature coast live oaks on the banks upstream from Lochinvar Road. Much of the bank has been eroded, exposing the roots of these trees. Rocks have been scattered around the roots and along the banks to retard the erosion.

Two mature black walnut trees and ornamental coast redwoods occur along the margin of the bank. A narrow band of 6-foot high arroyo willows grows along the base of the streambank for a distance of 30 to 40 yards. A low thicket of redscale saltbush covers a small portion of the upstream bank. The in-channel vegetation is composed predominantly of horsetails.

Coast live oak, walnuts, and redwood trees provide important wildlife habitat in this reach of the creek. Oak and black walnut provide food for various species of birds, and all three tree species provide nesting, cover and roosting habitat. The willow and saltbush thickets also serve as cover and nesting habitat. Wildlife associated with oaks and walnuts include typical species such as scrub jay, house finch, northern mockingbird, and American robin. Ground-foraging birds observed in this habitat include mourning dove, brown towhee, and migrants such as western flycatcher.

Impacts

Trees likely to be removed include 11 large coast live oaks and 5 walnuts. In addition, some smooth willow, arroyo willow and poison oak will be removed from the streambed and lower banks. A total of 22 trees are likely to be removed. Temporary impacts on resident and transient wildlife will be caused by the removal of riparian forest.

The removal of vegetation and the construction of gabion channel linings and access ramps will impart a man-made appearance to the channel.

There will be traffic impacts on Homestead Road during the installation of two additional box culverts.

Mitigation

A Mitigation and Monitoring Plan has been developed for impacts to riparian habitat. Replacement riparian habitat will be installed to compensate for construction impacts.

The revegetation plan provides for the planting and establishment of 128 trees and 244 shrubs/ground cover in this reach. Details of the revetetation plan and the plant list are included in Appendix S.

Monitoring

Detailed plans and specifications for mitigation measures will be developed by the District. District inspectors would oversee implementation to insure conformance to specifications. Survival of vegetation materials and other parameters of success will be monitored. A monitoring program is included in Appendix S.

The gabions will be covered with soil to minimize the structural appearance of the modified channel. The revegetation program has also been designed to produce vegetation which will eventually soften and screen the artificial appearance of the modified channel. In areas where concrete is visible to traffic or neighboring properties, it will be architecturally treated to minimize the visual impact.

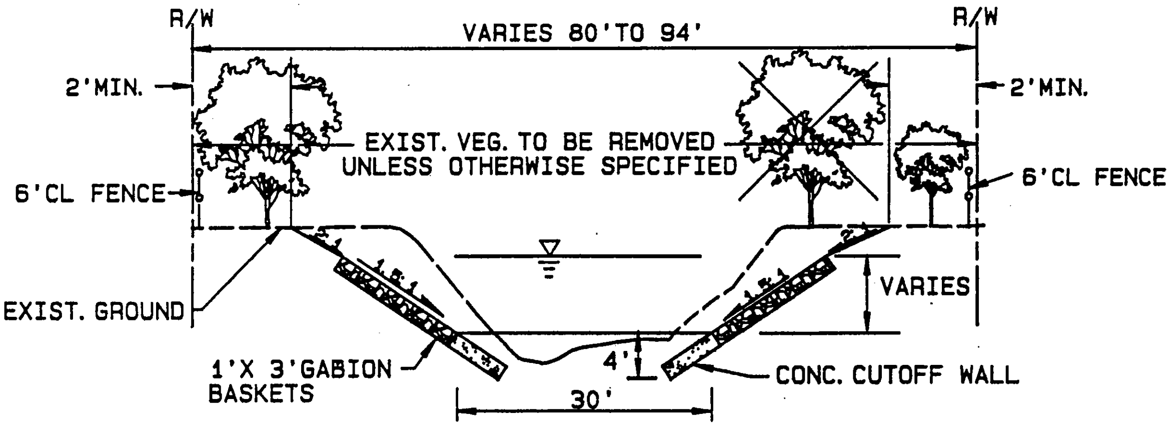
Prior to construction, a traffic plan will be developed to minimize disruption to traffic and insure proper safety precautions.

Costs

The total estimated project cost in Reach 2 is $1,118,511. A detailed cost estimate is included in Appendix F.

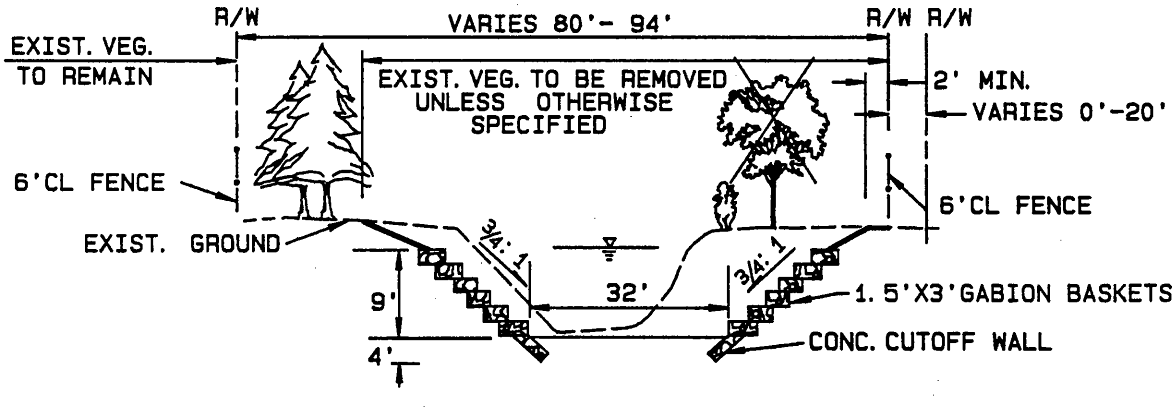
TYPICAL SECTION E
Calabazas Creek
(Station 309+80 to Station 311+90)

REACH 2: Upstream of Lochinvar Avenue to Upstream of Homestead Road



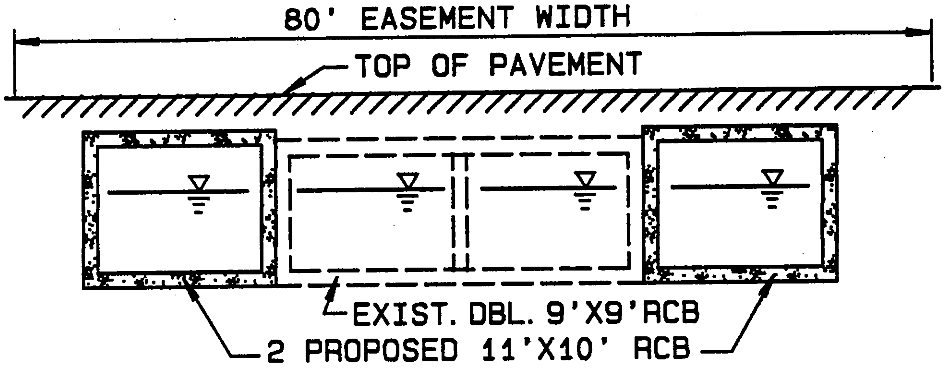
TYPICAL SECTION F
Calabazas Creek
(Station 311+90 to Station 313+90)

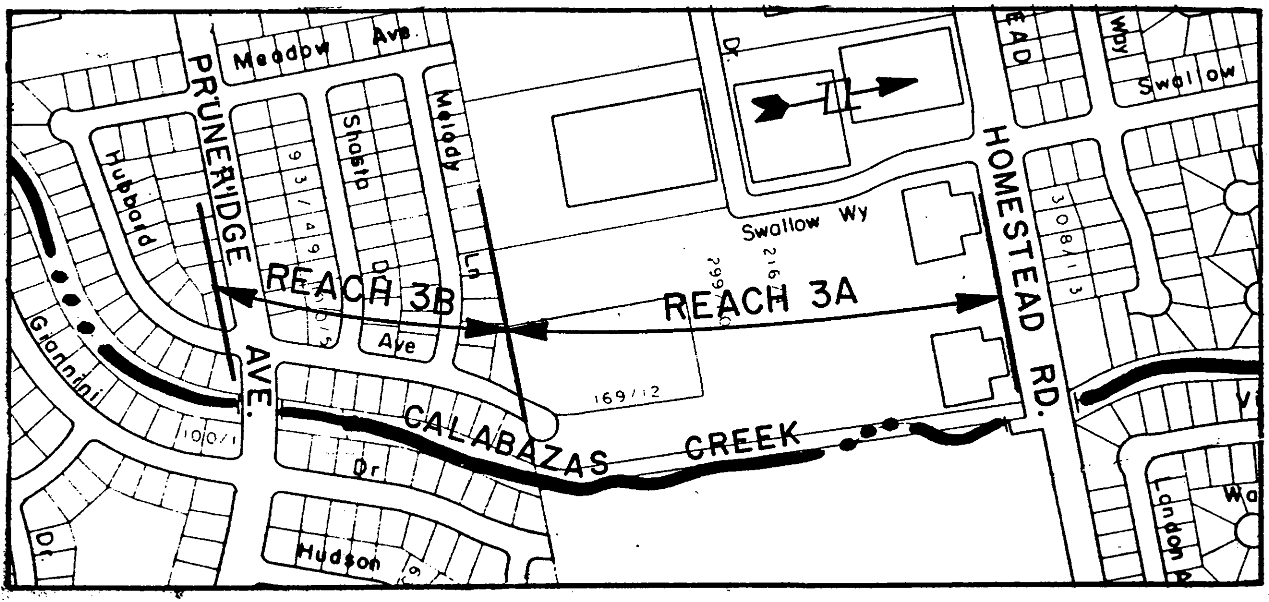
REACH 2: Upstream of Lochinvar Avenue to Upstream of Homestead Road



TYPICAL SECTION G
Calabazas Creek
Homestead Road Culverts

REACH 2: Upstream of Lochinvar Avenue to Upstream of Homestead Road





REACH 3: Upstream of Homestead Road to Upstream of Pruneridge Avenue

Reach 3 includes two subreaches. Reach 3A extends from upstream of Homestead Road to a point about 1,300 feet upstream. The existing earth channel is straight. The banks are moderately eroded. Adjacent land uses in Reach 3A are agricultural and industrial. The District currently owns a 40-foot right of way on the west side of the creek in Reach 3A adjacent to the industrial areas.

Reach 3B extends to upstream of Pruneridge Avenue. Adjacent land use is residential. The creek is an excavated earth channel. The existing right of way is 80 feet wide and is fenced on both sides. There are known soil contamination sites in the vicinity of this reach. Appendix U provides information about those sites and a management plan.

Proposed Measures

The proposed project consists of regrading the earth channel and providing stepped gabion channel bank lining, constructing two concrete access ramps and constructing additional concrete culverts under Pruneridge Avenue. These measures would provide 1 percent flood flow capacity, channel stability and improved maintenance access. Planting of hundreds of native riparian trees and shrubs is proposed along the upper banks.

Reach 3A

The proposed flood control measures in Reach 3A include enlarging the earth channel and lining the banks with stepped gabions. The channel bottom would be wide enough to accommodate unrestricted growth of riparian vegetation within a designated 15-foot area on the east side of the channel and still maintain flood flow capacity. Typical Section H shows the stepped gabions proposed for this reach.

A concrete maintenance ramp would be constructed upstream of Homestead Road to provide continuous access throughout this reach. Additional right of way (47 feet) would be acquired from the agricultural land on the east side of the creek. The agricultural and industrial frontage would need to be fenced as part of this project. Locking gates would be installed at access ramps.

Reach 3B

The proposed alignment would be within the existing right of way and offset to preserve existing trees on the east bank. Typical Section I shows the stepped gabion channel proposed for this reach.

A concrete maintenance ramp would be constructed downstream of Pruneridge Avenue to provide continuous access throughout this Reach.

The existing 16- by 10-foot RCB at Pruneridge Avenue would be augmented by constructing an additional 11- by 10-foot RCB on each side. Any utilities affected would be replaced at District cost unless, by a previous agreement, the owner is responsible for those costs. The proposed culvert modifications are shown in Typical Section J. An 80-foot right of way acquisition across Pruneridge Avenue would be required.

Vegetation and Wildlife (Reach 3A)

This subreach includes both disturbed and relatively natural riparian environments. The eroding west bank has been recently cleared of vegetation. In contrast, the east side of the creek retains much of its vegetative cover. Dominant plant species located in this section of the creek include arroyo, smooth, and black willow. Some of these specimens spread 20 feet or more from the border of the creekbed to the top of the bank. The crowns of these species approach 30 feet in height. A few coast live oak, elderberry, buckeye, walnut, and almond occur with the willows and other shrubs. Patches of coyote brush, poison oak and other herbaceous plants flank much of the intervening areas between these trees. The in-channel vegetation consists of Pacific bentgrass, dallis grass, and other herbaceous plants commonly associated with wet soils. Clumps of cattail and umbrella sedge occur where water is near the soil surface.

The willow trees are used for cover by western and dusky flycatchers, Anna's hummingbirds, northern mockingbirds, and ruby-crowned kinglets. Oaks, elderberry, walnut, and almond trees scattered among the willows on the bank are sources of food and cover for other birds and mammals. White-crowned, song and Lincoln's sparrow, and other ground foraging birds look for seeds and insects among the coyote brush, poison oak, and herbs along the streambank. These birds often venture into the streambed vegetation of cattails, sedges and grasses.

Impacts (Reach 3A)

Trees likely to be removed include 11 black walnuts, 1 coast live oak, and 5 buckeyes. Blue elderberry, arroyo willow, smooth willow, black willow, and yellow willow thickets would likely be removed on the east bank of the creek. A total of 38 trees are likely to be removed.

Portions of the private parking lot on the west side of the creek extend into District right of way.

These portions would have to be removed to accommodate the project.

There are known soil contamination sites in the vicinity of this reach. There are ten ground water monitoring wells adjacent to the top of the bank along this reach which are likely to be affected by the proposed channel excavation. Appendix U provides information about those sites and a management plan.

Vegetation and Wildlife (Reach 3B)

Dense thickets of willows in the streambed define the beginning of this subreach. Willow cover is nearly continuous across the stream channel. On the bank above the creek, a mixed canopy of elderberry, oak, buckeye, and walnut provide continuous dense cover. Many of the houses bordering the creek have chain-link fences, often covered with ivy or other climbing vines. At least one landowner has extended his landscaping beyond his own property and has planted iceplant and redwood trees on the eastern streambank. Upstream, coast live oaks and Monterey pines line the sparsely vegetated channel. Beneath the trees, a sparse community of wild oats, ripgut brome and soft chess is found. In relatively treeless areas, field mustard, bull thistle, blackberry, and iceplant occur. California bay provides additional cover, but most of these are rooted well above the active channel. The dense stands of oak, walnut, buckeye, and elderberry on both banks above the creek are important because they provide food and cover for birds and mammals. Scrub jays, bushtits, northern mockingbirds, house finchs, Bewick's wrens, and fox squirrels were observed in these trees. The understory of grass and blackberry produces seeds and berries, and attract insects for ground-foraging birds and mammals like white-crowned sparrow, brown towhee, Brewer's blackbird, and squirrel. Both the tall tree canopy and well-developed understory are significant wildlife resources.

Impacts (Reach 3B)

Trees likely to be removed include 4 blue elderberry, 1 buckeye, 14 coast live oak, 1 California bay, and 1 small-leaf elm. Arroyo willow, smooth willow, and blackberry thickets would also likely be removed. A total of 21 trees are likely to be removed. Temporary impacts on resident and transient wildlife will be caused by the removal of riparian forest.

The removal of vegetation and the construction of gabion channel linings and access ramps will impart a man-made appearance to the channel.

There will be traffic impacts on Pruneridge Avenue during the installation of two additional box culverts.

Mitigation (Reaches 3A and 3B)

A Mitigation and Monitoring Plan has been developed for impacts to riparian habitat. Replacement riparian habitat will be installed to compensate for construction impacts.

The revegetation plan provides for establishment of in-stream vegetation in Reach 3A and planting and establishment of 318 trees and 776 shrubs/ground covers along the slopes of Reach 3B. Details of the revegetation plan and the plant list are included in Appendix S.

The gabions will be covered with soil to minimize the structural appearance of the modified channel. The revegetation program has also been designed to produce vegetation which will eventually soften and screen the artificial appearance of the modified channel. In areas where concrete is visible to traffic or neighboring properties, it will be architecturally treated to minimize the visual impact.

Prior to construction, a traffic plan will be developed to minimize disruption to traffic and insure proper safety precautions.

Monitoring (Reaches 3A and 3B)

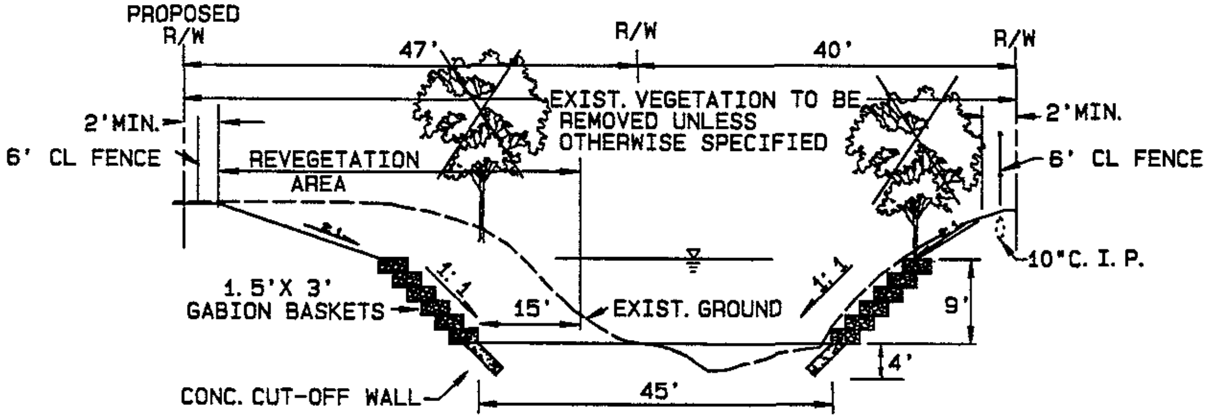
Detailed plans and specification for mitigation measures will be developed by the District. District inspectors would oversee implementation to insure conformance to specifications. Survival of vegetation materials and other parameters of success will be monitored. A monitoring program is included in Appendix S.

Costs

The total estimated project cost in Reach 3 is $2,123,434. A detailed cost estimate is included in Appendix F.

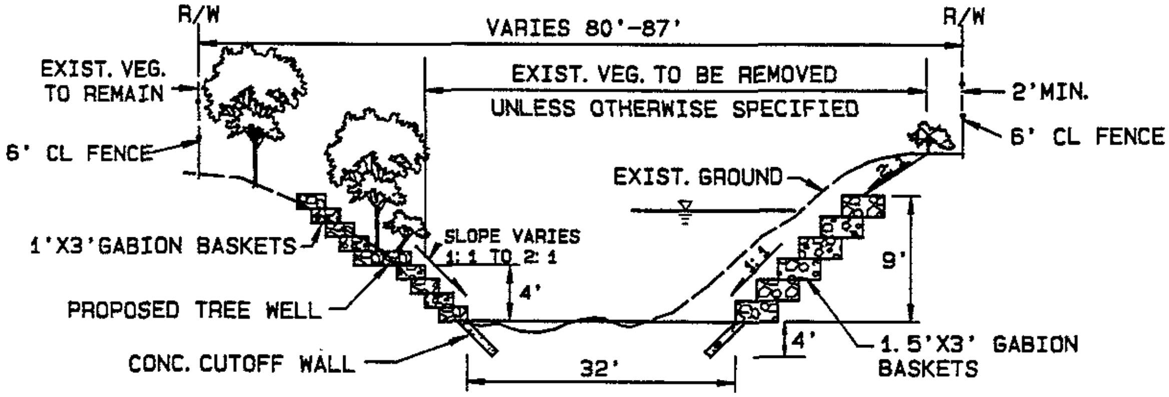
TYPICAL SECTION H
Calabazas Creek
(Station 318+72 to Station 327+00)

REACH 3A: Upstream of Homestead Road to 1,365 Feet Upstream



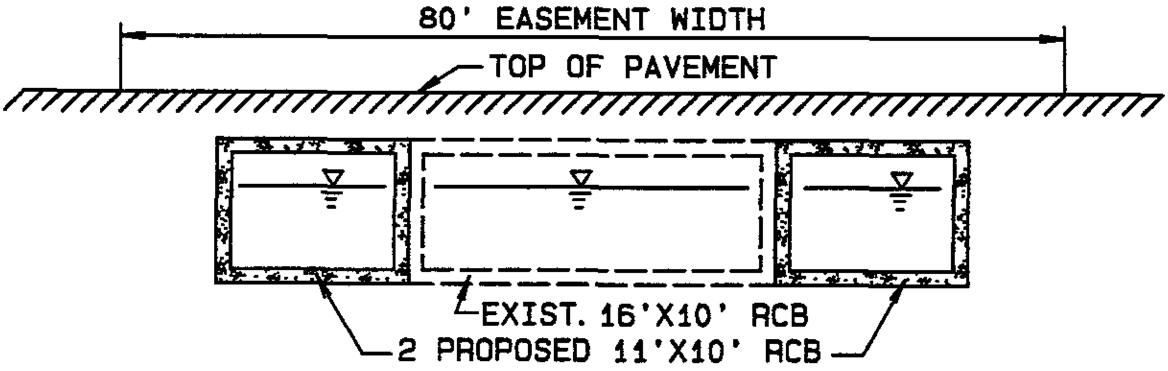
TYPICAL SECTION I
Calabazas Creek
(Station 330+00 to Station 336+27)

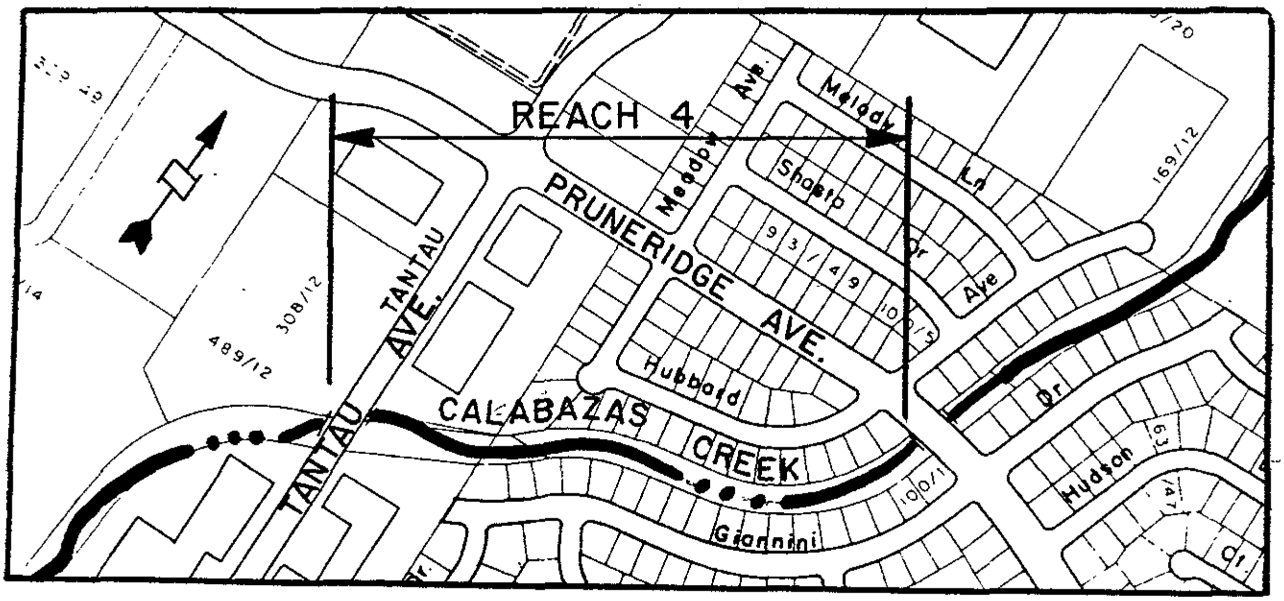
Reach 3B: 1,365 Feet Upstream of Homestead Road to Upstream of Pruneridge Avenue



TYPICAL SECTION J
Calabazas Creek
Pruneridge Avenue Culverts

REACH 3B: 1,365 Feet Upstream of Homestead Road to Upstream of Pruneridge Avenue





REACH 4: Upstream of Pruneridge Avenue to Upstream of Tantau Avenue

Reach 4 extends from upstream of Pruneridge Avenue to upstream of Tantau Avenue for a total length of 1,620 feet. Rock riprap and concrete rubble have been placed intermittently to repair the excavated earth channel. Adjacent land uses are residential and industrial. The existing right of way is 80 feet wide and is fenced in the residential area only.

Proposed Measures

The proposed project consists of regrading the earth channel and providing stepped and mattress gabion channel bank lining, constructing concrete access ramps and constructing additional concrete culverts under Tantau Avenue. These measures would provide 1 percent flood flow capacity, channel stability and improved maintenance access. Planting of hundreds of native riparian trees and shrubs is proposed along the upper banks.

The stepped gabions would start at Pruneridge Avenue and be aligned to preserve existing trees on the east bank for a length of 1,500 feet. Typical Section K shows the stepped gabion channel proposed for this Reach. Continuous fencing of the right of way would be provided as part of this project.

Concrete maintenance ramps would be constructed upstream of Pruneridge Avenue and downstream of Tantau Avenue for access to the channel in this reach. The existing double 10- by 8-foot RCB at Tantau Avenue would be augmented by constructing a double 11- by 10-foot RCB. Any utilities affected would be relocated at District cost unless, by a previous agreement, the owner is responsible for those costs. Acquisition of an 80-foot wide easement under Tantau Avenue would be required. The proposed culvert modifications are shown in Typical Section L.

Vegetation and Wildlife (Lower 1,300 Feet)

The easterly bank of this stretch of Calabazas Creek is densely vegetated with a nearly continuous cover of mature trees and shrubs. The northern bank has a few clumps of trees and shrubs interspersed between patches of herbaceous vegetation. The trees in this reach are predominantly coast live oaks, but a variety of horticultural species are also present. These include blue gum eucalyptus, pepper, silver wattle, English walnut, apple, apricot, almond, olive, and plum. In addition, two tree species representative of native riparian communities, box elder and Western sycamore, also occur.

Rubble and riprap from past bank improvement projects are scattered along the streambanks and channel. Compared to other sections of Calabazas Creek, there are few signs of erosion here. Vegetation on the streambanks consists largely of grasses and forbs. Isolated clumps or individuals of coyote brush provide limited shrub cover within the channel and along the upslope margins of the channel.

The oaks along the outer margin of this creek section form a tall, dense canopy on the eastern bank. This continuous layer of trees provides abundant foraging, cover and nesting habitat for wildlife and is an important resource. Lesser goldfinch, bushtit, western flycatcher, western wood peewee, and ruby-crowned kinglet were observed in the trees. The reduced tree cover on the western bank of the creek provides less valuable habitat, although ground-foraging species use the herbs and shrubs for a source of seeds and insects. Introduced trees such as blue gum, apple, apricot, and almond offer food, cover and nesting habitat for many species like scrub jay, northern mockingbird, American crow, raccoon, squirrel, and opossum.

Vegetation and Wildlife (Upper 300 Feet)

Light industrial facilities and parking lots border both sides of the creek in this area. The vegetation consists of a few scattered trees and a sparse ground cover of herbaceous plants. Coyote brush, elderberry, and an escaped ornamental pyracantha are the only small trees and shrubs present in the reach. The creek channel is clogged with concrete rubble from past bank stabilization efforts. However, some dallis grass, knotweed, and a few willow sprouts are present. At the downstream end of this reach, a clump of Lombardy poplar saplings occurs in the stream channel.

The limited vegetation cover on the banks and upper margins of the creek in this reach make it relatively poor wildlife habitat. The streambed community of willows, poplar saplings, elderberry, and pyracantha shrubs, however, is used by birds such as northern mockingbird, scrub jay, and American robin.

Impacts

In the lower 1,300 feet of Reach 4, approximately 22 trees are likely to be removed. Trees likely to be removed include 10 coast live oaks, 1 box elder, 1 apple, 3 pepper trees, and 4 black walnuts. In addition, thickets of arroyo willow and dusty willow are likely to be removed from the streambed and along the lower banks. In the upper 300 feet of Reach 4, 1 large cluster of acacia trees is likely to be removed. Temporary impacts on resident and transient wildlife will be caused by the removal of riparian forest.

The removal of vegetation and the construction of gabion channel linings and access ramps will impart a man-made appearance to the channel.

There will be traffic impacts on Tantau Avenue during the installation of two additional box culverts.

Mitigation

A Mitigation and Monitoring Plan has been developed for impacts to riparian habitat. Replacement riparian habitat will be installed to compensate for construction impacts.

The revegetation plan provides for the planting and establishment of 153 trees and 391 shrubs/groundcovers in this reach. Details of the revegetation plan and the plant list are included in Appendix S.

The gabions will be covered with soil to minimize the structural appearance of the modified channel. The revegetation program has also been designed to produce vegetation which will eventually soften and screen the artificial appearance of the modified channel. In areas where concrete is visible to traffic or neighboring properties, it will be architecturally treated to minimize the visual impact.

Prior to construction, a traffic plan will be developed to minimize disruption to traffic and insure proper safety precautions.

Monitoring

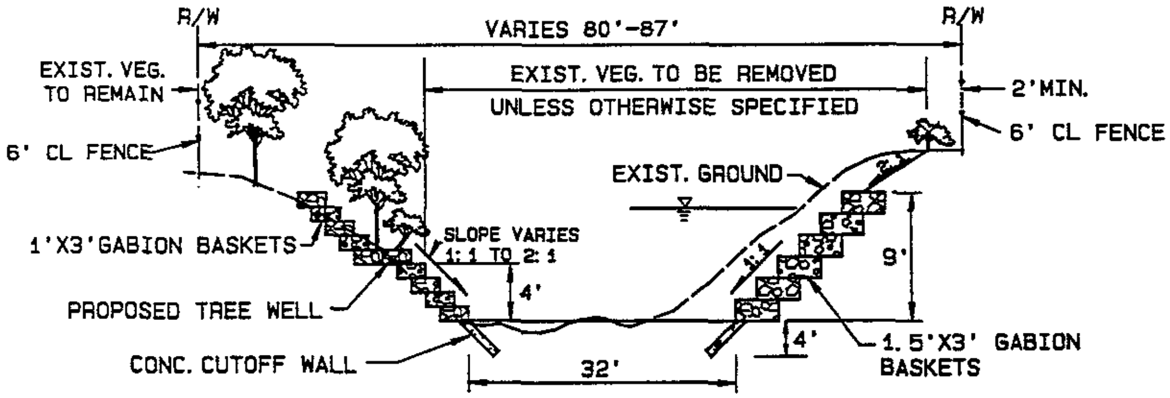
Detailed plans and specifications for mitigation measures will be developed by the District. District inspectors would oversee implementation to insure conformance to specifications. Survival of vegetation materials and other parameters of success will be monitored. A monitoring program is included in Appendix S.

Costs

The total estimated project cost in Reach 4 is $1,679,212. A detailed cost estimate is included in Appendix F.

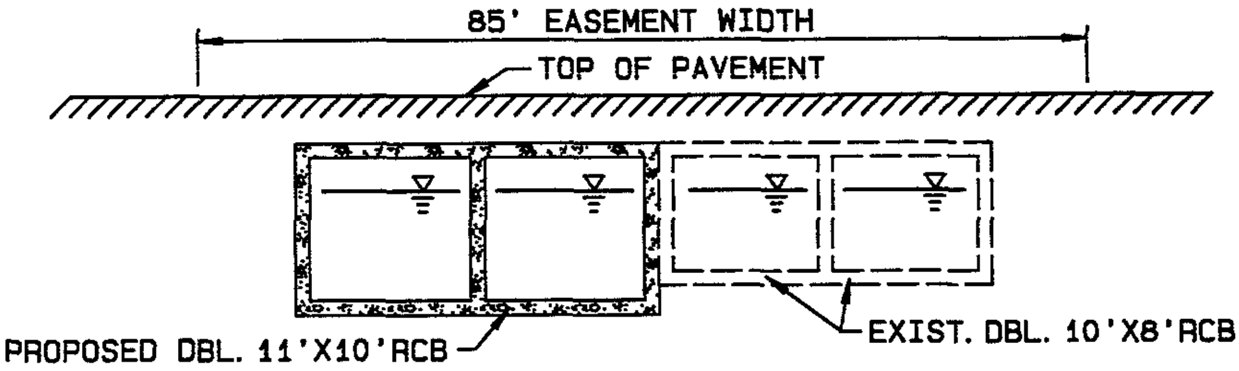
TYPICAL SECTION K
Calabazas Creek
(Station 339+37 to Station 352+20)

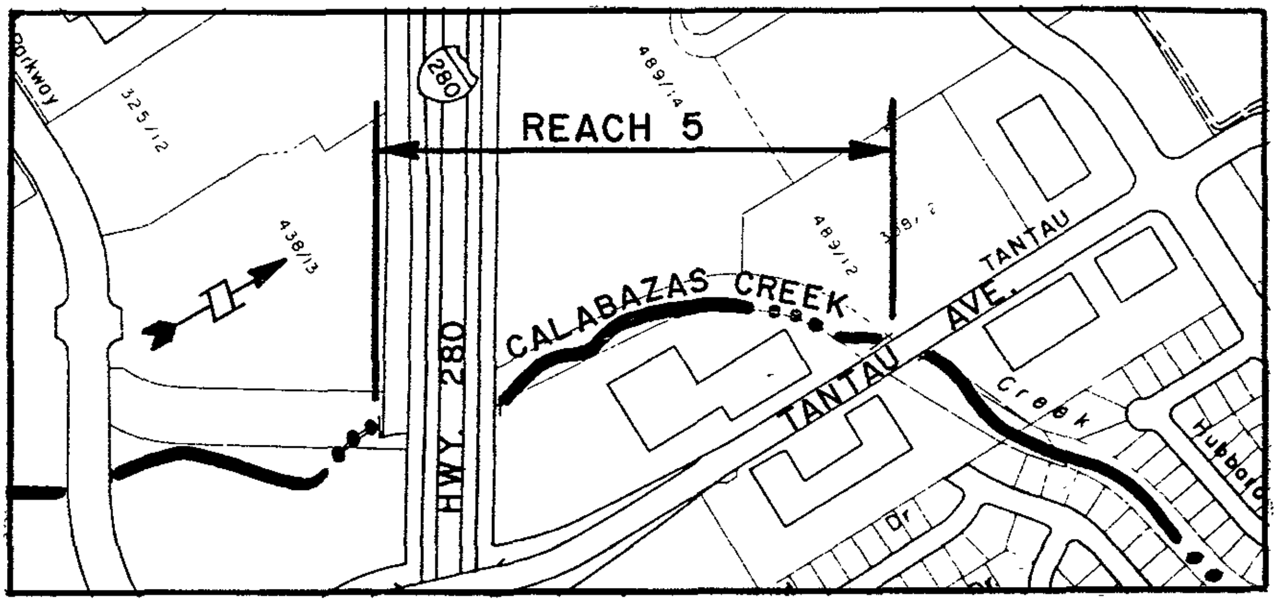
REACH 4: Upstream of Pruneridge Avenue to Upstream of Tantau Avenue



TYPICAL SECTION L
Calabazas Creek
Tantau Avenue Culverts

REACH 4: Upstream of Pruneridge Avenue to Upstream of Tantau Avenue





REACH 5: Upstream of Tantau Avenue to Upstream of Interstate 280

Reach 5 extends from upstream of Tantau Avenue to upstream of Interstate 280 for a total length of 1,300 feet. The excavated earth channel has been repaired with rock in several locations. Adjacent land uses are industrial. The existing right of way is 85 feet wide and is not fenced.

This reach contains temporary rights of way (easements) previously acquired to accommodate construction activities. Upon completion of the proposed project these easements will be quit claimed to the underlying property owners.

There are known soil contamination sites in the vicinity of this reach. Appendix U provides information about those sites and a management plan.

Proposed Measures

The proposed project consists of regrading the earth channel and providing stepped gabion channel bank lining, constructing a concrete access ramp, and replacing a concrete culvert transition at Interstate 280. These measures would provide 1 percent flood flow capacity, channel stability, and improved maintenance access. Planting of hundreds of native riparian trees and shrubs is proposed along the upper banks.

The proposed channel alignment would be within the existing right of way as shown in Typical Section M. Additional right of way will be acquired from the Tandem Computer Company to provide access from Tantau Avenue to the maintenance ramp located downstream of Interstate 280. Continuous fencing would be installed along the right of way. Locking gates would be installed at the access ramp.

A concrete access ramp would be constructed downstream Interstate 280 which would be the sole means of maintenance access for Reach 5. The existing sacked concrete culvert transition downstream of the Interstate 280 culvert would be replaced with a reinforced concrete transition. This would improve hydraulic performance and provide more reliable bank protection to adjoining properties.

Vegetation and Wildlife

For the most part, with the exception of some cattails and willows growing within the channel, this reach is relatively barren of vegetation and is highly eroded. The banks are steep sided and almost vertical in places, especially at the downstream end of the west bank. The vegetation consists largely of a few scattered walnut and valley oak saplings. The upslope borders of the banks are also relatively barren except for a few scattered shrubs, such as coyote brush and elderberry, and a uniform row of young redwood trees on the west side. A group of buckeye trees and coyote brush are found on the west bank near Interstate 280.

The dense patches of cattails and willows in the streambed are used by wildlife species commonly associated with marshes and wetlands. These include the common yellowthroat and redwing blackbird. The few scattered patches of shrubs and trees on the north bank of the creek are used for cover by birds like mourning dove and brown towhee. Because of its limited extent, however, this scattered vegetation is not good wildlife habitat. In addition, parking lots and industrial buildings on either side of the creek detract from the wildlife habitat value of this reach.

Impacts

Trees likely to be removed include two elderberry, one black walnut, one valley oak, and two buckeye. Small clumps of arroyo willow, coyote brush, and herbaceous plants will likely be removed from the streambed and the lower banks of the creek. A total of six trees are likely to be removed. The removal of vegetation and the construction of gabion channel linings and access ramps will impart a man-made appearance to the channel.

Mitigation

A Mitigation and Monitoring Plan has been developed for impacts to riparian habitat. Replacement riparian habitat will be installed to compensate for construction impacts.

The revegetation plan provides for the planting and establishment of 121 trees and 389 shrubs/ground covers in this reach. Details of the revegetation plan and the plant list are included in Appendix S.

The gabions will be covered with soil to minimize the structural appearance of the modified channel. The revegetation program has also been designed to produce vegetation which will eventually soften and screen the artificial appearance of the modified channel. In areas where concrete is visible to traffic or neighboring properties, it will be architecturally treated to minimize the visual impact.

Monitoring

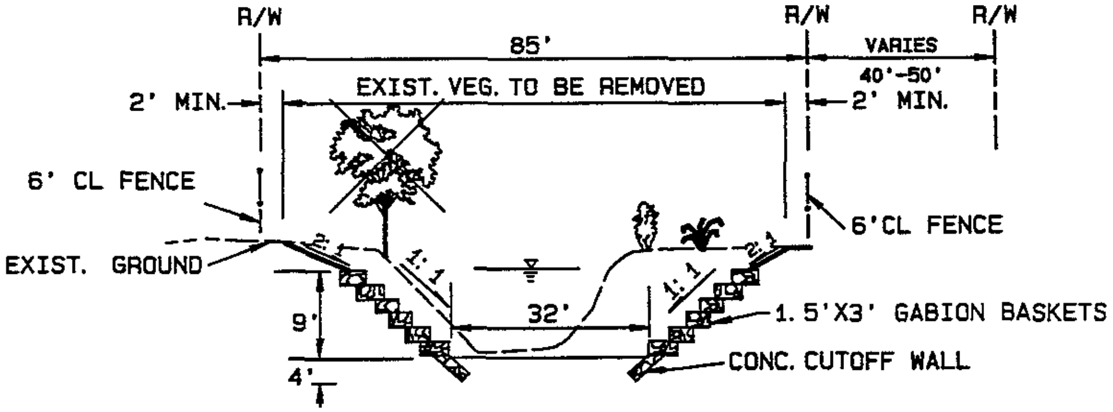
Detailed plans and specifications for mitigation measures will be developed by the District. District inspectors would oversee implementation to insure conformance to specifications. Survival of vegetation materials and other parameters of success will be monitored. A monitoring program is included in Appendix S.

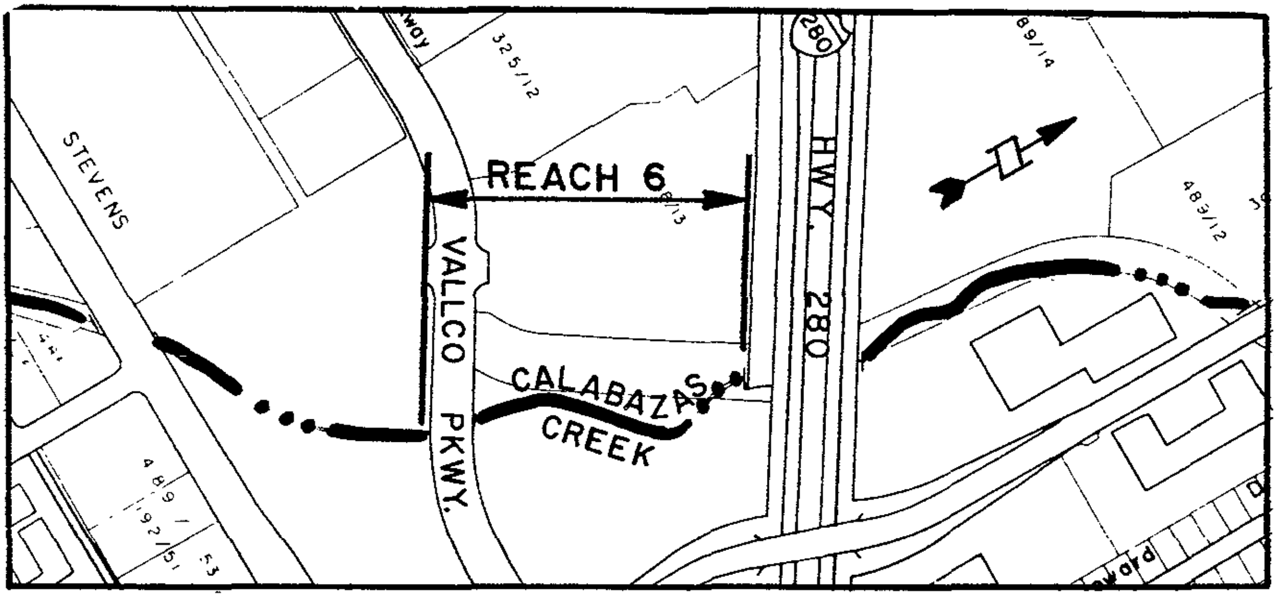
Costs

The total estimated project cost in Reach 5 is $929,939. A detailed cost estimate is included in Appendix F.

TYPICAL SECTION M
Calabazas Creek
(Station 356+05 to Station 364+70)

REACH 5: Upstream of Tantau Avenue to Upstream of Interstate 280

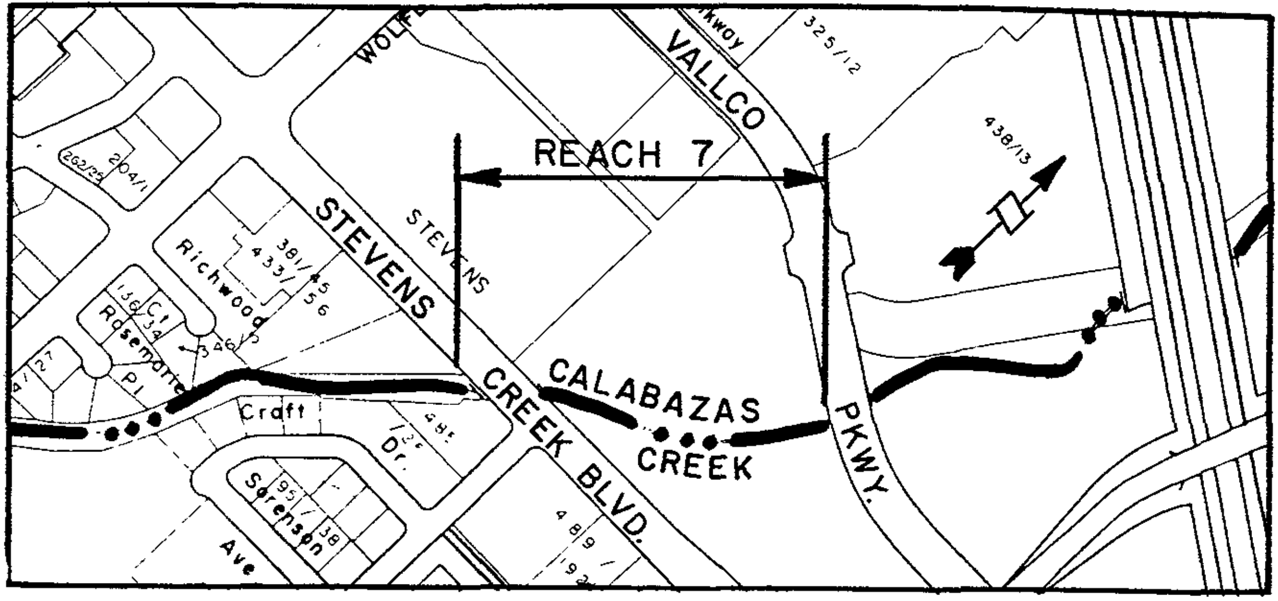


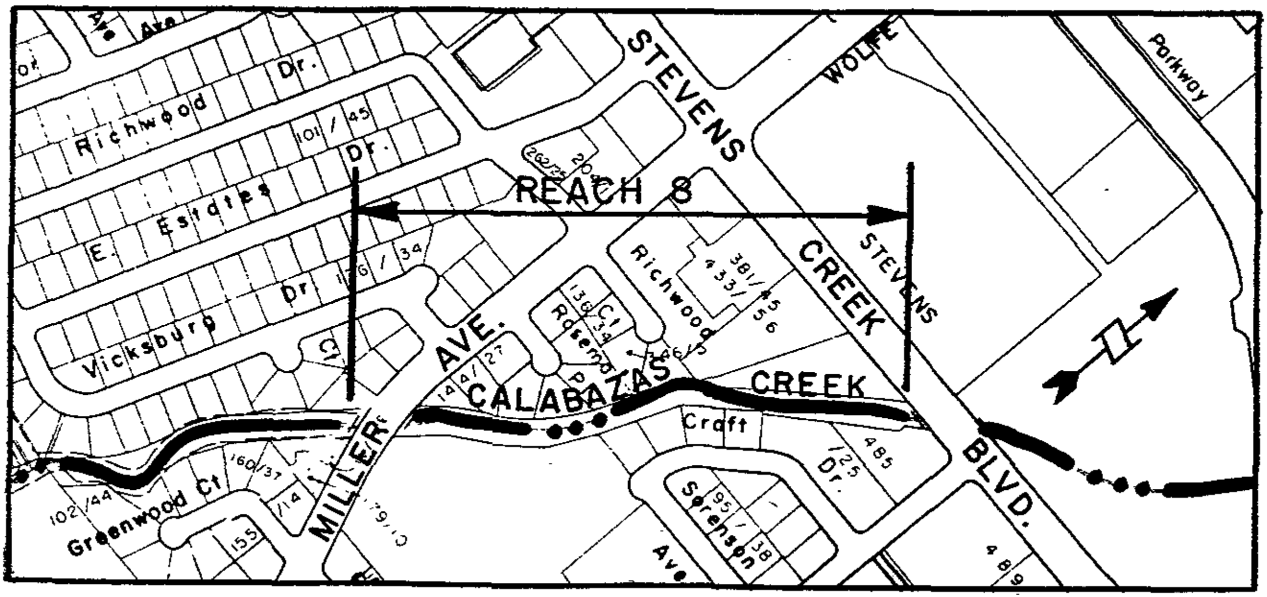


REACHES 6 and 7: Upstream of Interstate 280 to Upstream of Stevens Creek Boulevard

Reach 6 and 7 extend from upstream of Interstate 280 to upstream of Stevens Creek Boulevard for a length of 1,900 feet.

No modifications are proposed for these reaches because the creek adequately conveys the 1 percent flood flow and is not experiencing any significant problems.





REACH 8: Upstream of Stevens Creek Boulevard to Upstream of Miller Avenue

Reach 8 extends from upstream of Stevens Creek Boulevard to 100 feet upstream of Miller Avenue for a length of 1,500 feet. Most of the existing excavated earth channel has been lined with broken concrete. *Sacked concrete and soil cement line opposite banks for about 150 feet downstream of Stevens Creek* Boulevard. Adjacent land uses are commercial and residential. The existing right of way varies from 70 to 80 feet.

There are known soil contamination sites in the vicinity of this Reach. Appendix U provides information about these sites and a management plan.

Proposed Measures

The proposed project consists of regrading the existing channel and providing stepped gabion channel bank lining, constructing a concrete access ramp and replacing the Miller Avenue culvert with a clear span bridge. These measures would provide 1 percent flood flow capacity, channel stability and improved maintenance access. Planting of hundreds of native riparian trees and shrubs is proposed along the upper banks.

The proposed channel would be aligned within the existing right of way as shown in Typical Section N for 800 feet upstream of Stevens Creek Boulevard.

For 730 feet downstream of Miller Avenue, the District's right of way contains a 15-foot walkway easement along the east bank as shown in Typical Section O. The right of way is completely fenced along this reach. A concrete access ramp would be constructed along the east bank immediately downstream of the walkway easement. The walkway would be used by maintenance vehicles to reach the access ramp. This would be the sole access for maintenance on this reach.

The existing box culvert at Miller Avenue would be removed and replaced with a clear span bridge. Any utilities affected would be relocated at District cost, unless by a previous agreement, the owner is responsible for those costs. Acquisition of a 70-foot wide easement under Miller Avenue would be required. The proposed bridge at Miller Avenue is shown in Typical Section P.

Vegetation and Wildlife

This reach of Calabazas Creek is one of the most disturbed reaches within the proposed project modification area. The streambed is littered with concrete rubble and other debris. Streambed vegetation is limited to weedy grasses, cocklebur, horsetail, and a clump of escaped ornamental umbrella sedge.

Some stretches of banks are densely vegetated with wild blackberry, iceplant, English ivy, garden sweet-pea, anise, black mustard, and sow thistle. Downstream, near Stevens Creek Boulevard, the streambanks are mostly lined with sack concrete. A mature grove of Lombardy poplar grows just upstream from Stevens Creek Boulevard.

The banks are substantially eroded with steep sides and exposed tree roots. A few mature valley oaks grow on the upper portion of the banks and shade the degraded channel. Other trees include coast live oak, almond, elm, elderberry, walnut, buckeye, and California bay. These are usually scattered along the banks either as individuals or in small clumps.

This reach generally provides little cover or food for wildlife. Where the banks are covered with weeds, iceplant, English ivy, and dense thickets of blackberry, ground-foraging birds like brown and rufous-sided towhee, mourning dove and white-crowned sparrow have been observed. The oak, almond, walnut and elderberry trees provide food, cover and nesting for wildlife like scrub jay, northern flicker, cedar waxwing, house finch, and fox squirrel.

Impacts

Trees likely to be removed include 1 coast live oak, 7 Lombardy poplar, 2 black walnut, 1 elderberry, and 2 buckeye. A total of 20 trees are likely to be removed. Temporary impacts on resident and transient wildlife will be caused by the removal of riparian forest.

The removal of vegetation and the construction of gabion channel linings and access ramps will impart a man-made appearance to the channel.

There will be traffic impacts on Miller Avenue during the removal of the existing culvert and construction of a new clear span bridge.

Mitigation

A Mitigation and Monitoring Plan has been developed for impacts to riparian habitat. Replacement riparian habitat will be installed to compensate for construction impacts.

The revegetation plan provides for the planting and establishment of 288 trees and 824 shrubs/ground covers in this reach. Details of the revegetation plan and the plant list are included in Appendix S.

The gabions will be covered with soil to minimize the structural appearance of the modified channel. The revegetation program has also been designed to produce vegetation which will eventually soften and screen the artificial appearance of the modified channel. In areas where concrete is visible to traffic or neighboring properties, it will be architecturally treated to minimize the visual impact.

Prior to construction, a traffic plan will be developed to minimize disruption to traffic and insure proper safety precautions.

Monitoring

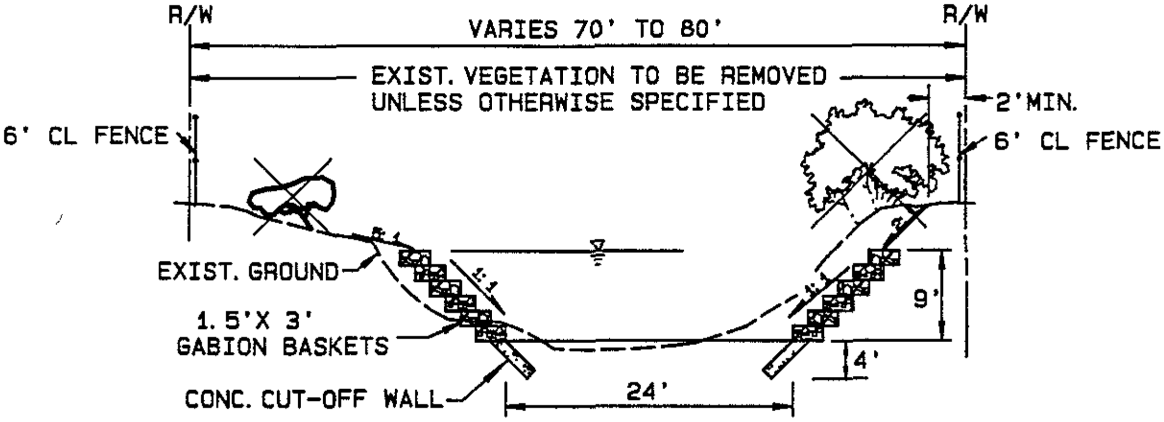
Detailed plans and specifications for mitigation measures will be developed by the District. District inspectors would oversee implementation to insure conformance to specifications. Survival of vegetation materials and other parameters of success will be monitored. A monitoring program is included in Appendix S.

Costs

The total estimated project cost in Reach 8 is $1,756,344. A detailed cost estimate is included in Appendix F.

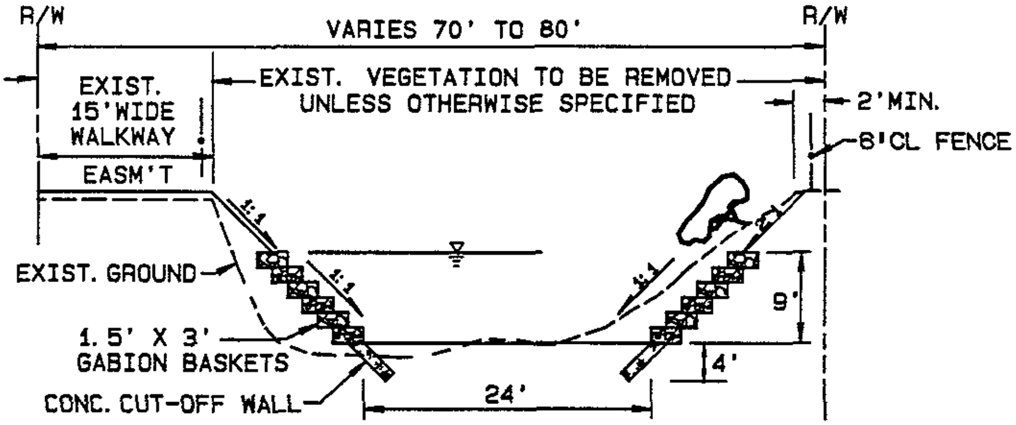
TYPICAL SECTION N
Calabazas Creek
(Station 386+60 to Station 394+60)

REACH 8: Upstream of Stevens Creek Boulevard to Upstream of Miller Avenue



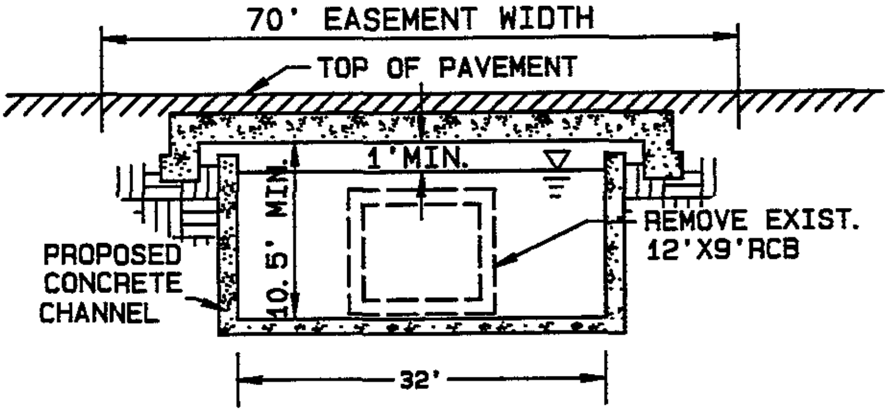
TYPICAL SECTION O
Calabazas Creek
(Station 394+60 to Station 398+90)

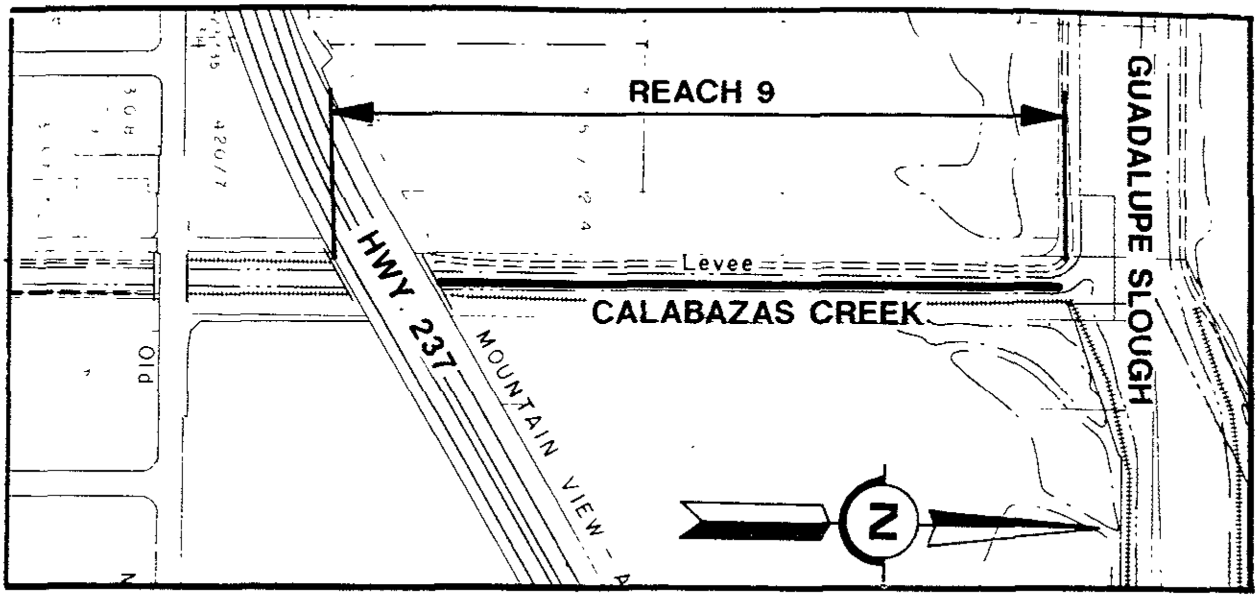
REACH 8: Upstream of Stevens Creek Boulevard to Upstream of Miller Avenue



TYPICAL SECTION P
Calabazas Creek
Miller Avenue Bridge

REACH 8: Upstream of Stevens Creek Boulevard to Upstream of Miller Avenue





REACH 9: Guadalupe Slough to Upstream of Highway 237

Reach 9 extends from the mouth of Calabazas Creek at Guadalupe Slough to upstream of Highway 237 for a total distance of 1,900 feet. The straight excavated earth channel is contained by levees. Adjacent land is vacant except for the City of Sunnyvale's storm water pumping facility to the west and Caltrans wetland mitigation site to the east. The right of way varies from 189 feet to 235 feet wide, and will accommodate all proposed measures.

Proposed Measures

The proposed project consists of raising the existing west levee, reconstructing the east levee, constructing approximately 200 feet of floodwall, modifying outfalls, constructing maintenance roads, and constructing bridge improvements. These measures will provide 1 percent flood flow capacity and improved maintenance efficiency.

The proposed measures include raising the existing west levee 4 feet and regrading the existing east levee to its existing height in a location thirty feet east of its present location. These measures will provide 1 percent flood protection to all lands west of the creek in Reach 9 and will preserve the currently existing level of protection (which is approximately a 10 percent event) to the single parcel east of Reach 9. The rebuilt levee would include an embedded reinforcing material to allow steeper side slopes. In those areas where it is determined during preparation of construction plans that raising levees is not practical, the concrete floodwall alternative may be substituted. On the east bank where Caltrans is developing a mitigation site adjacent to the District's proposed project, details of the levee modification may be adjusted depending on the results of geotechnical analysis and negotiations with Caltrans. The existing low flow channel would be realigned adjacent to the westerly levee with its westerly top of bank at elevation 6. The reconstructed east levee would provide an inboard bench approximately 30 feet wide at elevation 4.8 NGVD. This 1.7 acre bench would be subject to periodic tidal inundation several times per month and would be revegetated to establish a wetland mitigation area. Fifteen-foot wide maintenance roads would be constructed on top of the proposed raised levees. These roads would be surfaced with a crushed rock material to provide a wearing surface.

The existing floodwall adjacent to the City of Sunnyvale's storm water pumping facility would be raised or replaced. A new concrete floodwall is proposed to connect to the existing floodwall and extend approximately 200 feet upstream. The outfalls from the pumping facility would be modified to the new low flow channel.

Between the inboard toe of the east levee, and the low flow channel, the wetland mitigation area is proposed. Long-term observation of tidally influenced channels reveals that a low flow channel with mudflat sediment benches is a stable condition. Hundreds of thousands of dollars have been spent by the District to remove these sediment benches in the past with the result that habitat supported by the benches is destroyed in the process. The intent of the proposed project is to provide for stable configuration to occur without reducing the design flow capacity. This would dramatically reduce maintenance requirements and provide a more permanent habitat area compared to existing conditions which involves removal of sediment and vegetation.

The proposed bridge improvements include the construction of concrete floodwalls to floodproof the existing bridge at Moffett Park Drive which is located 50 feet downstream of Highway 237. These floodwalls would tie into the proposed levees. The floodwalls and floodproofing may be modified or eliminated depending upon the continuing use of the bridge. There is a possibility that this bridge will no longer be required in which case it should be removed.

The existing east and westbound bridges for Highway 237 will be demolished and replaced with new bridges as part of the State highway project. The new bridges would be constructed high enough to provide adequate freeboard.

To facilitate maintenance, concrete lining and ramps to the channel bottom are proposed immediately under Moffett Park Drive and the future Highway 237 bridges. Some of these features may be modified or eliminated depending upon the final highway design and negotiations with Caltrans on maintenance responsibilities.

Typical Sections Q through U show these measures with their equivalent alternative.

Vegetation and Wildlife

The existing channel was designed to function properly with a minimum amount of vegetation in the flow area. Since its construction, the amount of vegetation has varied depending upon maintenance frequency. Current maintenance practice is to keep the channel free of significant or mature vegetation which would impede flows.

The following observations were made during vegetation and wildlife surveys on March 19, September 1, and November 8, 1988. The channel is bordered by emergent wetland consisting mostly of bulrush with some cattails. The band of emergent wetland vegetation ranges from 5 to 10 feet wide and is more or less contiguous. Immediately upslope from the emergent wetland vegetation on the east bank is a strip of salt-affected tidal marsh that is regularly inundated by high tides. On both sides of the creek the berm and levee slope is covered with rip-gut brome, dock, cocklebur, and thistles. A few scattered strands of coyote brush, one clump of giant reed, and a few tree tobacco are the only shrubs or woody vegetation along this reach of the creek. The influence of the tides is very apparent along Reach 9. At low tide, a 3- to 9-foot band of slick mudflat appears between the emergent wetland vegetation and the water.

The wildlife value of the Reach 9 wetlands is enhanced by the cover of dense thickets of weedy upland vegetation, and by the large undeveloped parcels of land on both sides of the creek. Expected wildlife are described in the Streamside Biological Conditions Section of this report.

Impacts

Direct Impacts of Construction

Levee reconstruction, and shifting of the low flow channel will probably result in removing some of the vegetation between the levees. Mobile wildlife (e.g., birds and mammals such as raccoons and opossums) will be displaced from construction areas. Relatively immobile species (small mammals, some amphibians, mud- and soil-dwelling invertebrates) will be eliminated as a result of construction. These impacts would be most detrimental to wildlife if construction occurred during the spring, when most species are breeding.

Construction Impacts will be short-term. Under natural conditions, emergent wetland and riparian vegetation are subject to scouring flood flows. The species comprising these habitat types are therefore resilient and rapid colonizers, and are able to quickly reestablish themselves. Bulrush and cattails are able to reestablish in one growing season if root stock remains in the soil. Willows and cottonwoods will provide good wildlife habitat after a few growing seasons.

The construction of the replacement bridges for Highway 237 sponsored by the Santa Clara County Traffic Authority will impact approximately 0.10 acres of brackish riparian habitat on Calabazas Creek. Mitigation for this impact and other impacts resulting from the Caltrans Highway 237 project is identified in Caltrans' Final Environmental Impact Report/Statement dated May 1990.

Long-Term Impacts of Maintenance Activities

The assessment of impacts to Calabazas Creek's biological resources as a result of the proposed flood control project must be considered in light of maintenance programs with and without the project. Silt deposition and wetland vegetation decrease the channel's flood-carrying capacity. To maintain the channel's ability to accommodate flood flows the District currently removes sediment and woody vegetation on a regular basis (every 2 to 4 years). The project is designed to increase the flood-carrying capacity of the channel, and substantially reduce the need for such maintenance. Less frequent maintenance would be a net benefit to wildlife and vegetation resources, and would be a positive effect of the proposed project.

Impacts to Special Status Species

Salt marsh harvest mice, clapper rails, and black rails do not occur at Calabazas Creek, and therefore, will not suffer adverse impacts as a result of the project. Breeding common yellowthroats will not be adversely affected by the project if all vegetation clearing and construction activities occur after the breeding season has been completed (July 1, or later).

Burrowing owls are not known to currently inhabit the Calabazas Creek levees. Eliminating a burrowing owl burrow could be a potentially significant wildlife impact.

Mitigation

A Mitigation and Monitoring Plan has been developed for impacts to wetlands to cumulatively compensate for construction impacts in Reaches 9, 10, and 11. A replacement wetland will be created along the easterly bank of Reach 9 and along adjacent San Tomas Aquino Creek. Details of this plan are included in Appendix S.

In order to mitigate for impacts to wildlife, vegetation clearing and construction activities would not begin until after July 1, when most species have completed the breeding season. Survey for burrowing owls would be conducted prior to levee reconstruction. If burrowing owls are found, a detailed plan for their relocation will be developed. The relocation site, the location methodology, and a monitoring program will be determined with assistance from the California Department of Fish and Game.

Monitoring

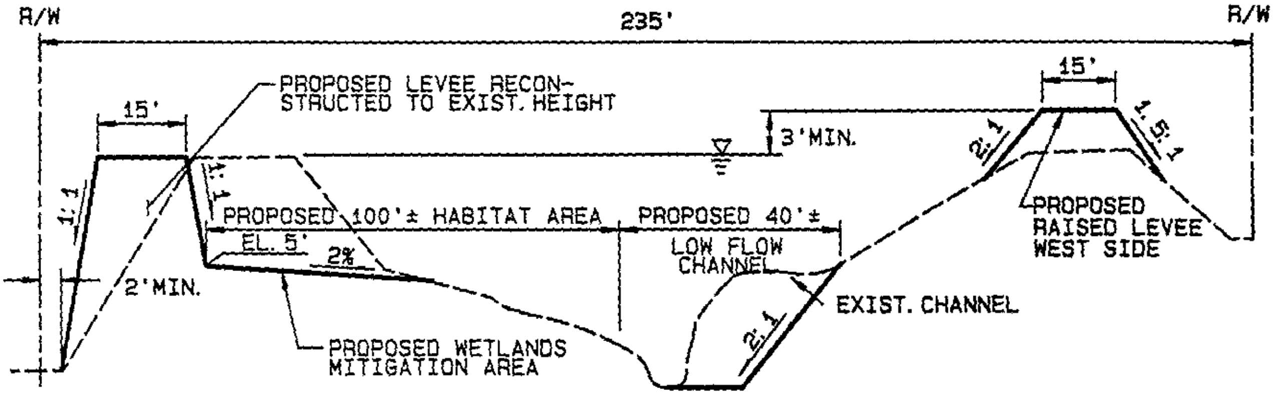
Detailed plans and specifications for mitigation will be developed by the District. District inspectors will oversee implementation to insure conformance to the specifications. A monitoring program is included in Appendix S.

Costs

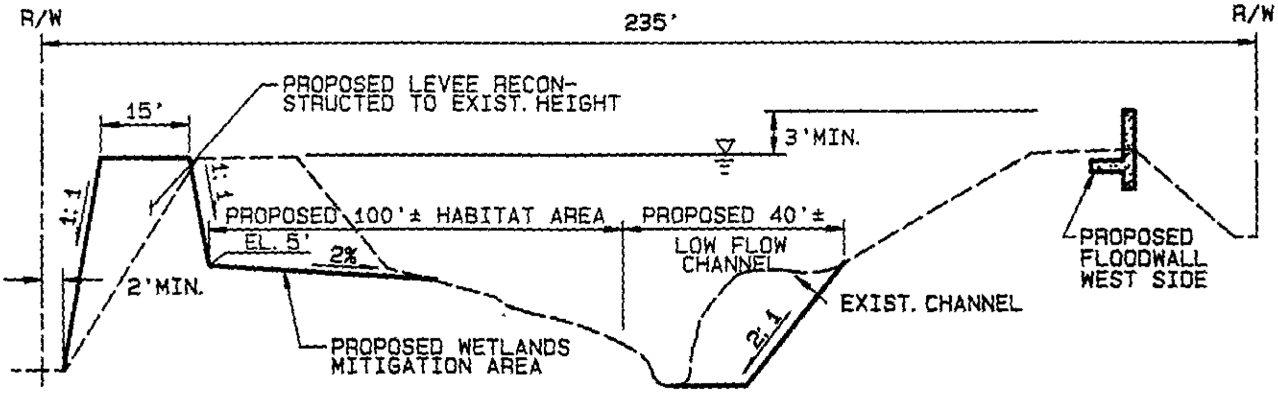
The total estimated project cost in Reach 9 is $824,490. A detailed cost estimate is included in Appendix F.

TYPICAL SECTION Q
Calabazas Creek
(Station 0+00 to Station 7+60)

REACH 9: Upstream of Guadalupe Slough to Upstream Highway 237

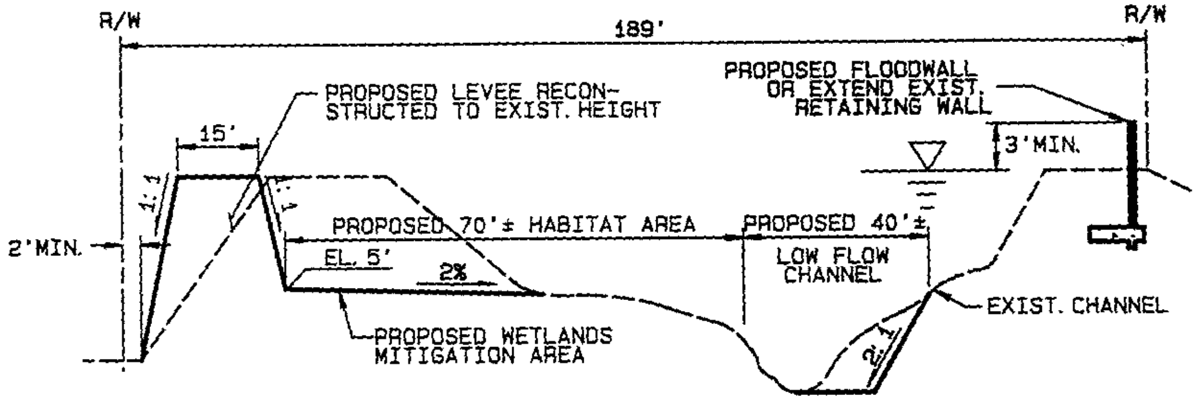

R/W
235'
R/W
15'
PROPOSED LEVEE RECONSTRUCTED TO EXIST. HEIGHT
3'MIN.
15'
2:1
1.5:1
1:1
1:1
PROPOSED 100'± HABITAT AREA
PROPOSED 40'±
LOW FLOW CHANNEL
EL. 5'
2%
PROPOSED RAISED LEVEE WEST SIDE
2'MIN.
EXIST. CHANNEL
2:1
PROPOSED WETLANDS MITIGATION AREA

Floodwall Alternative


R/W
235'
R/W
PROPOSED LEVEE RECONSTRUCTED TO EXIST. HEIGHT
15'
3'MIN.
1:1
1:1
PROPOSED 100'± HABITAT AREA
PROPOSED 40'±
LOW FLOW CHANNEL
EL. 5'
2%
PROPOSED FLOODWALL WEST SIDE
2'MIN.
EXIST. CHANNEL
2:1
PROPOSED WETLANDS MITIGATION AREA

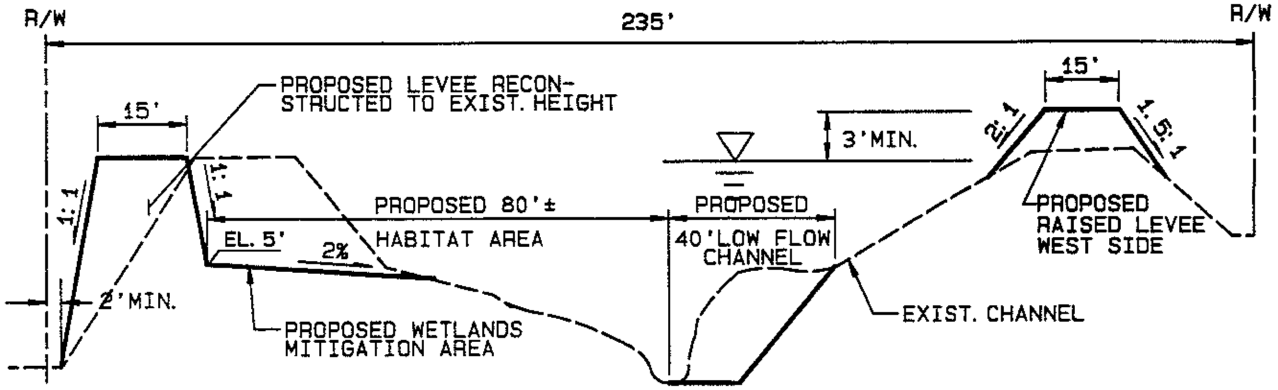
TYPICAL SECTION R
Calabazas Creek
(Station 7+60 to Station 12+23)

REACH 9: Upstream Guadalupe Slough to Upstream Highway 237

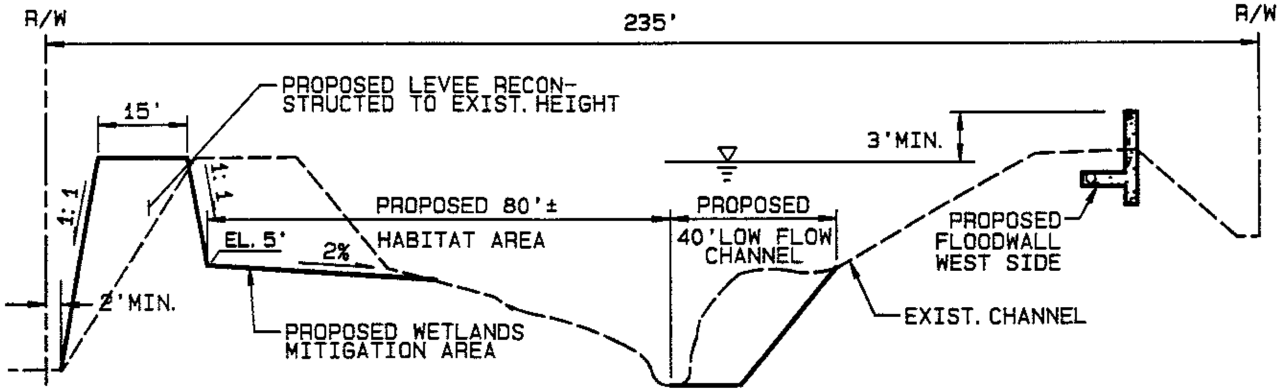


TYPICAL SECTION S
Calabazas Creek
(Station 12+23 to Station 14+65)

REACH 9: Upstream Guadalupe Slough to Upstream Highway 237

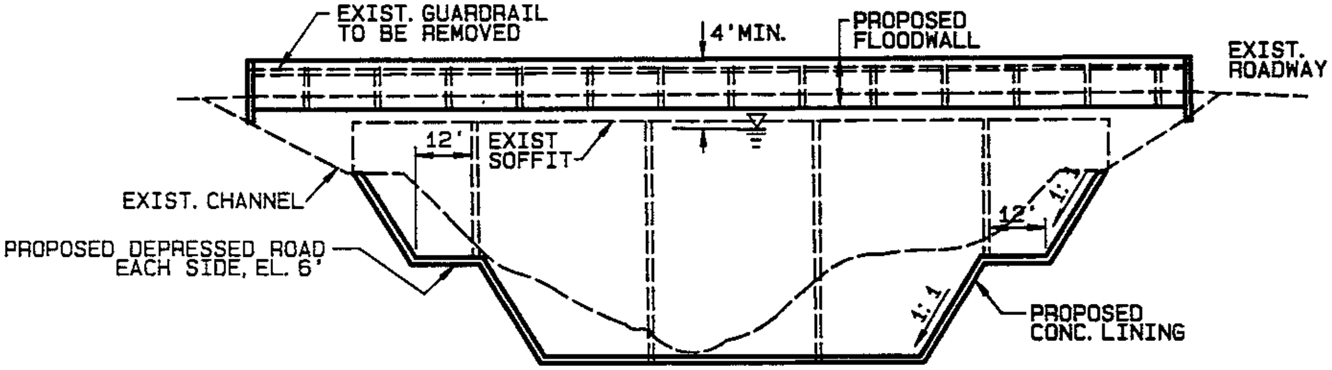


Floodwall Alternative



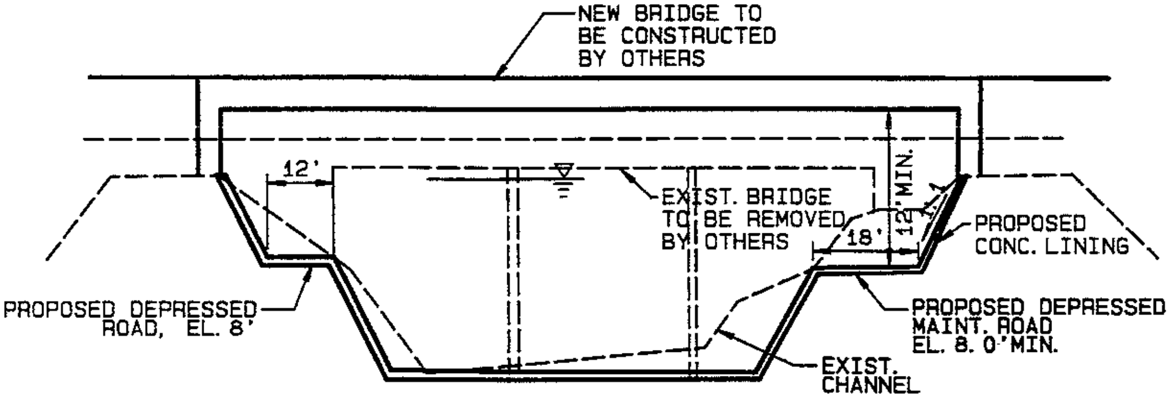
TYPICAL SECTION T
Calabazas Creek
Moffett Park Drive Bridge

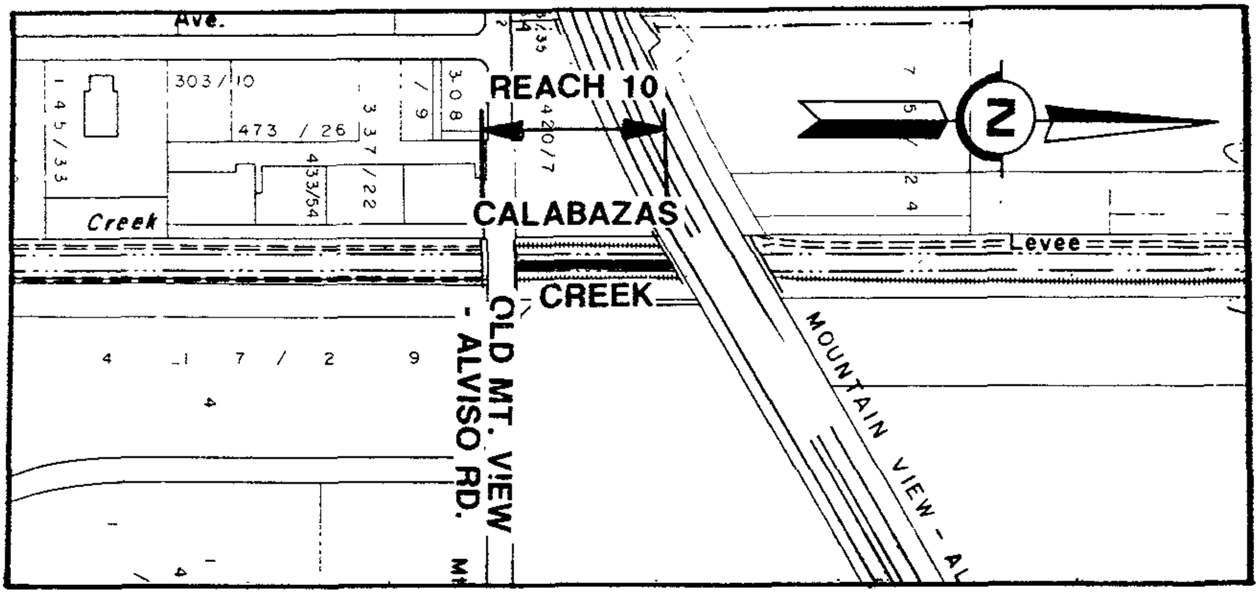
REACH 9: Upstream Guadalupe Slough to Upstream Highway 237



TYPICAL SECTION U
Calabazas Creek
Highway 237 Bridge

REACH 9: Upstream Guadalupe Slough to Upstream Highway 237


NEW BRIDGE TO BE CONSTRUCTED BY OTHERS
12'
EXIST. BRIDGE TO BE REMOVED BY OTHERS
12'MIN.
18'
1:1
PROPOSED CONC. LINING
PROPOSED DEPRESSED ROAD, EL. 8'
PROPOSED DEPRESSED MAINT. ROAD EL. 8.0'MIN.
EXIST. CHANNEL



REACH 10: Upstream of Highway 237 to Upstream of Old Mountain View-Alviso Road

Reach 10 extends from upstream of Highway 237 to upstream of Old Mountain View-Alviso Road, a total distance of 500 feet. The straight excavated earth channel is contained by levees. Adjacent land uses are industrial. The existing right of way is 195 feet wide, and will accommodate all proposed measures. There are known soil contamination sites in the vicinity of this reach. Appendix U provides information about those sites and a management plan.

Proposed Measures

The proposed project consists of raising the existing levees, realigning the low flow channel and constructing maintenance roads, access ramps, and bridge improvements. These measures will provide a 1 percent flood flow capacity and improved maintenance efficiency and access.

The proposed flood control measures include reconstructing a portion of and raising all existing levees approximately 4 feet. The rebuilt levees would include an embedded reinforcing material to allow steeper side slopes. The levee design may be modified or the concrete floodwall alternative may be substituted, depending upon the final recommendations of the geotechnical investigation. A depressed maintenance road would be constructed adjacent to the westerly levee at elevation 8 which is higher than the average high tide elevation. The existing low flow channel would be realigned adjacent to the westerly depressed maintenance road. A 15-foot maintenance road would be constructed on top of each proposed raised levee. These roads would be surfaced with a crushed rock material to provide a wearing surface.

Between the west depressed maintenance road and the toe of the easterly levee, the area not occupied by the proposed low flow channel would be designated as a reduced-maintenance habitat area. Emergent wetland vegetation such as cattails and bulrushes will be allowed to naturally revegetate in this area.

The proposed bridge modifications include the construction of concrete floodwalls to floodproof the Old Mountain View-Alviso Road bridge. These floodwalls would tie into the proposed raised levees. To facilitate maintenance, concrete lining and a ramp to the channel bottom is proposed immediately under the bridge.

Typical Sections V and W show these measures with their equivalent alternative.

Vegetation and Wildlife

The existing channel was designed to function properly with a minimum amount of vegetation in the flow area. Since its construction, the amount of vegetation has varied depending upon maintenance frequency. Current maintenance practice is to keep the channel free of significant or mature vegetation which would impede flows.

The following observations were made during vegetation and wildlife surveys on March 19, September 1, and November 8, 1988. This short stretch of Calabazas Creek is very similar to Reach 9 in terms of vegetation types and wildlife resources. The eastern side of this reach was cleared in May 1988. Cattails and bulrushes were already beginning to grow within months. Reach 10 does not support any salt-affected tidal marsh, although it is similarly subject to tidal influence.

Impacts

Since Reach 10 is very similar to Reach 9 in terms of vegetation types and wildlife resources, the project impacts in Reach 10 will be similar to those in Reach 9. Levee reconstruction may also impact existing landscaping located near the toe on the outboard side of the existing levee. This impact would be limited to ground covers which have grown a few feet into the right of way.

Mitigation

A Mitigation and Monitoring Plan has been developed for impacts to wetlands to cumulatively compensate for construction impacts in Reaches 9, 10, and 11. A replacement wetland will be created along the easterly bank of Reach 9 and along adjacent San Thomas Aquino Creek. Details of this plan are included in Appendix S.

In order to mitigate for impacts to wildlife, vegetation clearing and construction activities would not begin until after July 1, when most species have completed the breeding season. Survey for borrowing owls would be conducted prior to levee reconstruction. If burrowing owls are found, a detailed plan for their relocation will be developed. The relocation site, the location methodology, and a monitoring program will be determined with assistance from the California Department of Fish and Game.

Monitoring

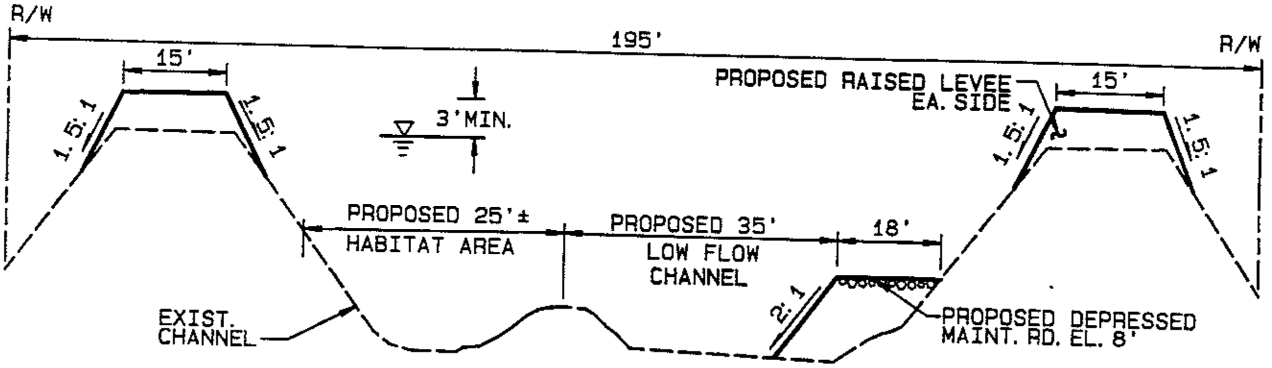
Detailed plans and specifications for mitigation will be developed by the District. District inspectors will oversee implementation to insure conformance to the specifications. A monitoring program is included in Appendix S.

Costs

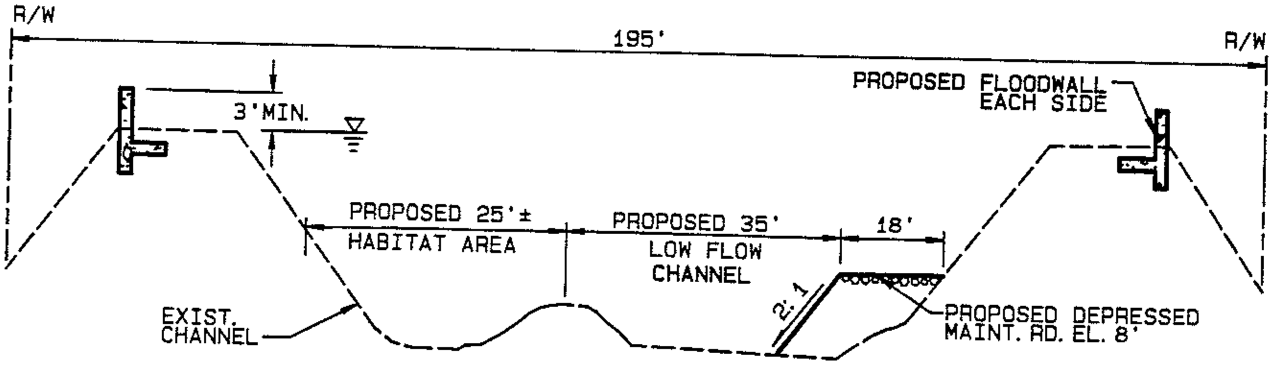
The total estimated project cost in Reach 10 is $269,223. A detailed cost estimate is included in Appendix F.

TYPICAL SECTION V
Calabazas Creek
(Station 20+30 to Station 23+20)

REACH 10: Upstream of Highway 237 to Upstream Old Mountain View-Alviso Road

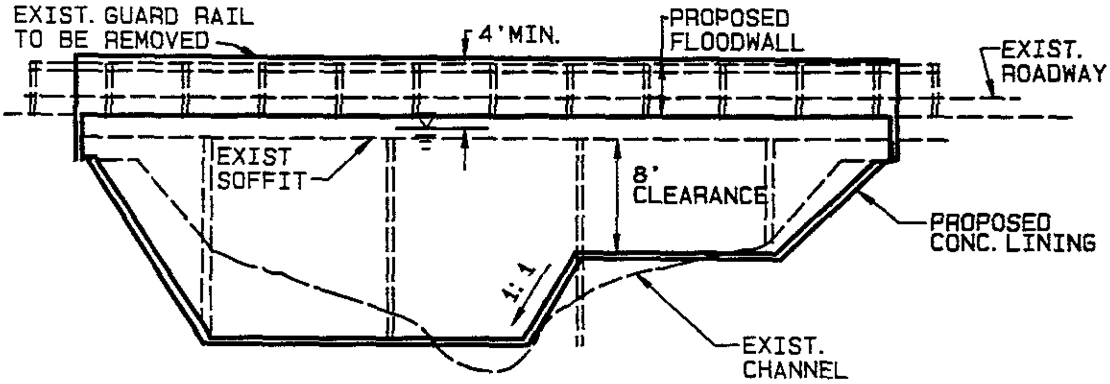

R/W
195'
R/W
15'
1.5:1
1.5:1
3'MIN.
PROPOSED RAISED LEVEE EA. SIDE
15'
1.5:1
1.5:1
PROPOSED 25'± HABITAT AREA
PROPOSED 35' LOW FLOW CHANNEL
18'
2:1
EXIST. CHANNEL
PROPOSED DEPRESSED MAINT. RD. EL. 8'

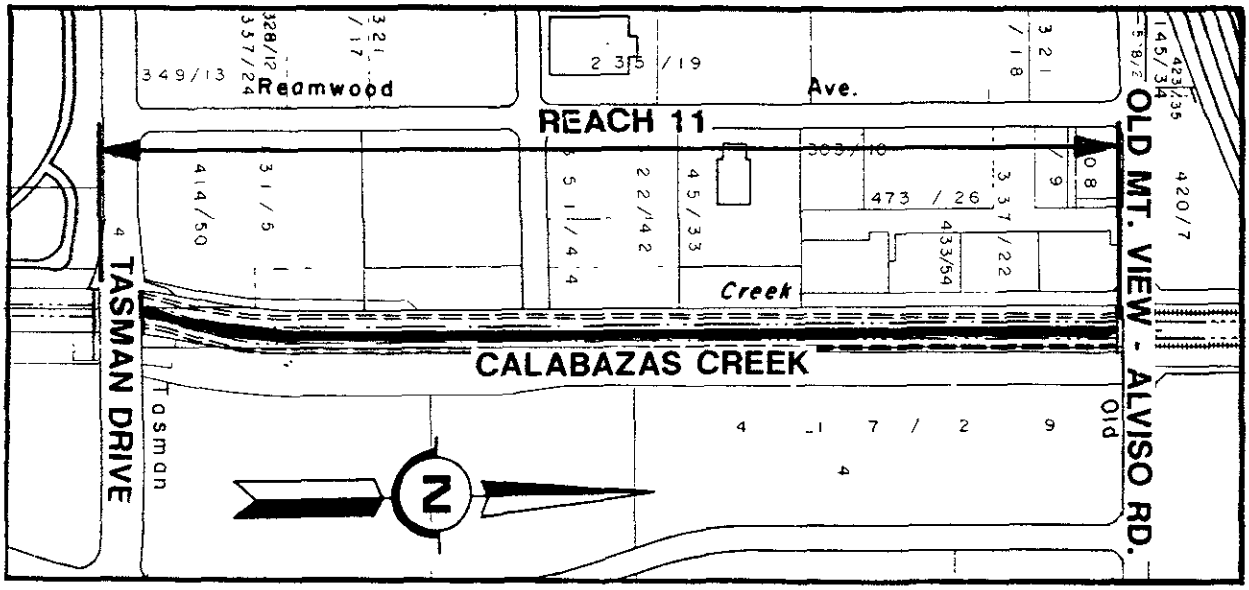
Floodwall Alternative


R/W
195'
R/W
3'MIN.
PROPOSED FLOODWALL EACH SIDE
PROPOSED 25'± HABITAT AREA
PROPOSED 35' LOW FLOW CHANNEL
18'
2:1
EXIST. CHANNEL
PROPOSED DEPRESSED MAINT. RD. EL. 8'

TYPICAL SECTION W
Calabazas Creek
Old Mountain View-Alviso Road Bridge

REACH 10: Upstream of Highway 237 to Upstream Old Mountain View-Alviso Road





REACH 11: Upstream of Old Mountain View-Alviso Road to Upstream of Tasman Drive

Reach 11 extends from upstream of Old Mountain View-Alviso Road to upstream of Tasman Drive for a total length of 2,650 feet. The straight excavated earth channel is contained by levees. Adjacent land uses are industrial. The existing right of way varies from 200 to 240 feet wide, and will accommodate all proposed measures. There are known soil contamination sites in the vicinity of this reach. Appendix U provides information about those sites and a management plan.

Proposed Measures

The proposed project consists of raising the existing levees, regrading the channel bottom, and constructing maintenance roads, access ramps, and bridge modifications. These measures will provide 1 percent flood flow capacity and improved maintenance efficiency and access.

The proposed flood control measures include reconstructing a portion of and raising all existing levees approximately 4 feet. The rebuilt levees would include an embedded reinforcing material to allow steeper side slopes. The levee design may be modified or the concrete floodwall alternative may be substituted, depending upon the final recommendations of the geotechnical investigation. Depressed maintenance roads would be constructed adjacent to levees at elevation 8 which is higher than the average high tide elevation. The existing low flow channel would be realigned adjacent to the easterly maintenance road. A 15-foot maintenance road would be constructed on top of each proposed raised levee. These roads would be surfaced with a crushed rock material to provide a wearing surface. Upstream of Old Mountain View-Alviso Road, a continuous lateral drain is proposed for 950 feet to relieve a standing water problem on the west bank.

Between the depressed maintenance roads, the area not occupied by the proposed low flow channel would be designated as a reduced-maintenance habitat area. Emergent wetland vegetation such as cattails and bulrushes will be allowed to naturally revegetate in this area.

The proposed bridge improvements include constructing concrete channel lining, maintenance roads and ramps under the Tasman Drive bridge to facilitate channel maintenance. This bridge is also proposed to be floodproofed by grouting any openings below the existing parapet wall, raising the wall and extending it into the proposed raised levees.

Typical Sections X, Y, Z, and AA show these proposed measures with their equivalent alternative.

Vegetation and Wildlife

The existing channel was designed to function properly only without a significant amount of vegetation in the flow area. Since its construction, the amount of vegetation has varied depending upon maintenance frequency. Current maintenance practice is to keep the channel free of significant or mature vegetation which would impede flows.

The following observations were made during vegetation and wildlife surveys on March 19, September 1, and November 2, 1988. The downstream section of this reach is very similar to Reaches 9 and 10 in that a 5 to 10-foot tidal fluctuation is apparent. Emergent wetland vegetation lines the channel and upland vegetation borders the bulrush and cattails on the berm and levee slope. The channel has cut close to the west levee in this reach, leaving a wide strip of annual grasses, dock, fennel, thistles, and other upland vegetation. The first shrub willow appears about 600 feet upstream from Old Mountain View-Alviso Road. Progressing upstream about 1,200 feet the creek begins to support more extensive thickets of riparian shrub/forest indicating a transition to a fresh water environment. Some elderberries and coyote brush occur in scattered patches on the levee slope and berm.

Approaching Tasman Avenue the creek supports 15- to 20-foot tall thickets of willow shrubs and trees. The densest patch of these willows occurs on an island midway between the east and west levees. The island was probably created by dredging activities that did not reach to the middle of the channel. The island is particularly good wildlife habitat because it provides a certain degree of protection from cats, dogs, and other predators, and because of the density of the vegetation.

Expected wildlife are described in the Streamside Biological Section of the chapter entitled "Study Background."

Impacts

Under the existing maintenance program, dredging from the east bank creates a second channel on the east side and a center island. This configuration provides nearly double the fish habitat at high tide compared to the low flow channel and bench configuration which develops when the sediments are allowed to accumulate. The proposed channel has been designed to accommodate sediments and the emergent wetlands vegetation which develops upon them. The frequency of dredging is expected to be lower. Consequently, the second channel will be absent for longer periods. This will be an adverse impact to the fishery because of the net reduction in the tidal zone and in areas supporting channel bordering vegetation (salt affected tidal marsh and aquatic vegetation). Invertebrates which are consumed by fishes are typically abundant in the channel bordering vegetation that becomes inundated with each tide.

Since Reach 11 is very Similar to Reach 9 in terms of vegetation types and wildlife resources, the project impacts in Reach 11 will be similar to those in Reach 9.

Mitigation

A Mitigation and Monitoring Plan has been developed for impacts to wetlands to cumulatively compensate for construction impacts in Reaches 9, 10 and 11. A replacement wetland will be created along the easterly bank of Reach 9 and along adjacent San Thomas Aquino Creek. Details of this plan are included in Appendix S.

In order to mitigate for impacts to wildlife, vegetation clearing and construction activities would not begin until after July 1, when most species have completed the breeding season. Survey for borrowing owls would be conducted prior to levee reconstruction. If burrowing owls are found, a detailed plan for their relocation will be developed. The relocation site, the location methodology, and a monitoring program will be determined with assistance from the California Department of Fish and Game.

It is uncertain what degree of impact that less frequent dredging will have on the fish habitat. The amount of tidal marsh and aquatic vegetation which would establish depends on the development of the sediment bench. It is the intent of the design to allow an equilibrium or natural state to develop with sufficient remaining channel capacity to convey the 1 percent design flood. If dredging becomes necessary, a secondary channel with a center island will be established to provide for additional fish habitat.

Monitoring

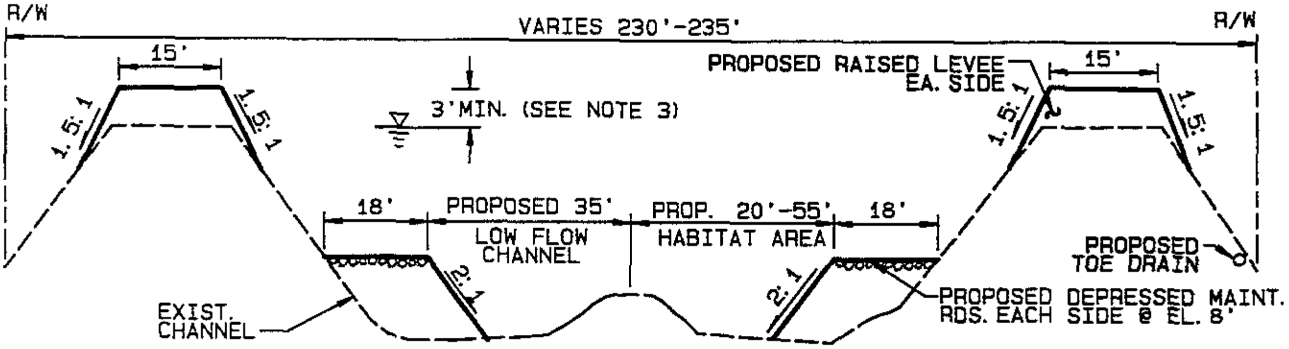
Detailed plans and specifications for mitigation will be developed by the District. District inspectors will oversee implementation to insure conformance to the specifications. A monitoring program is included in Appendix S.

Costs

The total estimated project cost in Reach 11 is $859,555. A detailed cost estimate is included in Appendix F.

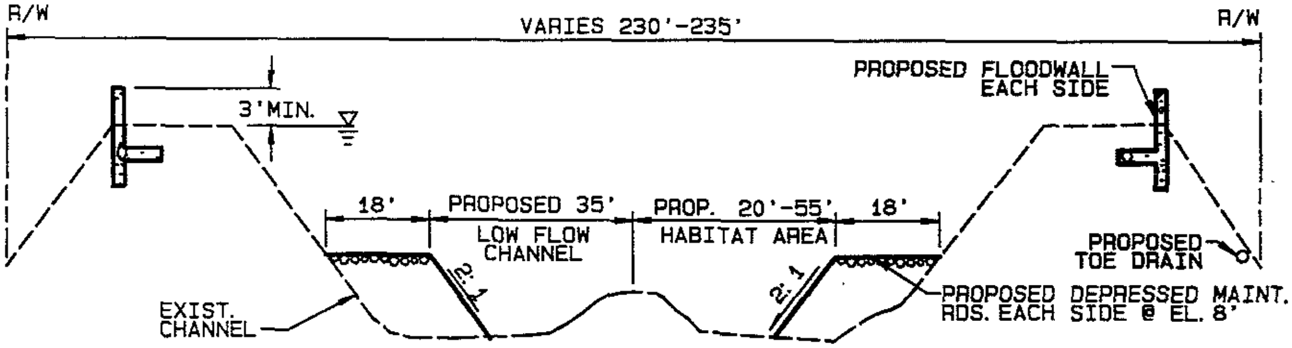
TYPICAL SECTION X
Calabazas Creek
(Station 24+85 to Station 35+60)

REACH 11: Upstream Old Mountain View-Alviso Road to Upstream Tasman Drive



R/W
VARIES 230'-235'
R/W
15'
1.5:1
1.5:1
3'MIN. (SEE NOTE 3)
PROPOSED RAISED LEVEE EA. SIDE
15'
1.5:1
1.5:1
18'
PROPOSED 35' LOW FLOW CHANNEL
PROP. 20'-55' HABITAT AREA
18'
PROPOSED TOE DRAIN
2:1
2:1
EXIST. CHANNEL
PROPOSED DEPRESSED MAINT. RDS. EACH SIDE @ EL. 8'

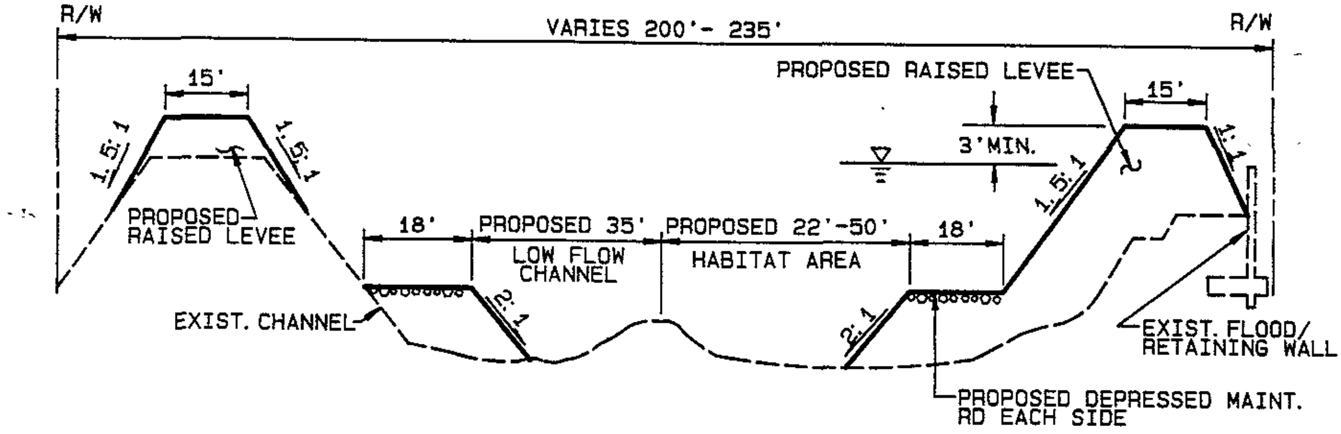
Floodwall Alternative



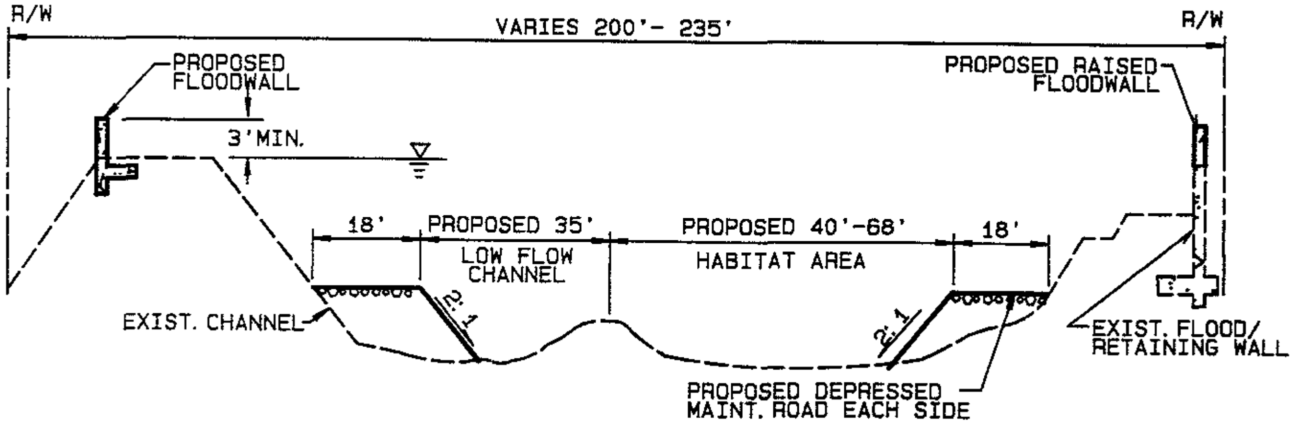
R/W
VARIES 230'-235'
R/W
3'MIN.
PROPOSED FLOODWALL EACH SIDE
18'
PROPOSED 35' LOW FLOW CHANNEL
PROP. 20'-55' HABITAT AREA
18'
PROPOSED TOE DRAIN
2:1
2:1
EXIST. CHANNEL
PROPOSED DEPRESSED MAINT. RDS. EACH SIDE @ EL. 8'

TYPICAL SECTION Y
Calabazas Creek
(Station 35+60 to Station 43+00)

REACH 11: Upstream Old Mountain View-Alviso Road to Upstream Tasman Drive

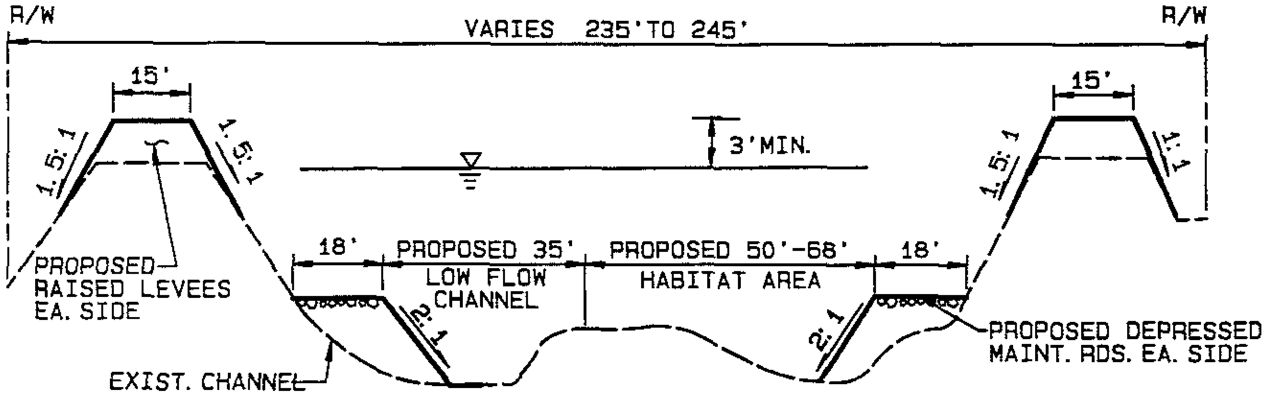


Floodwall Alternative

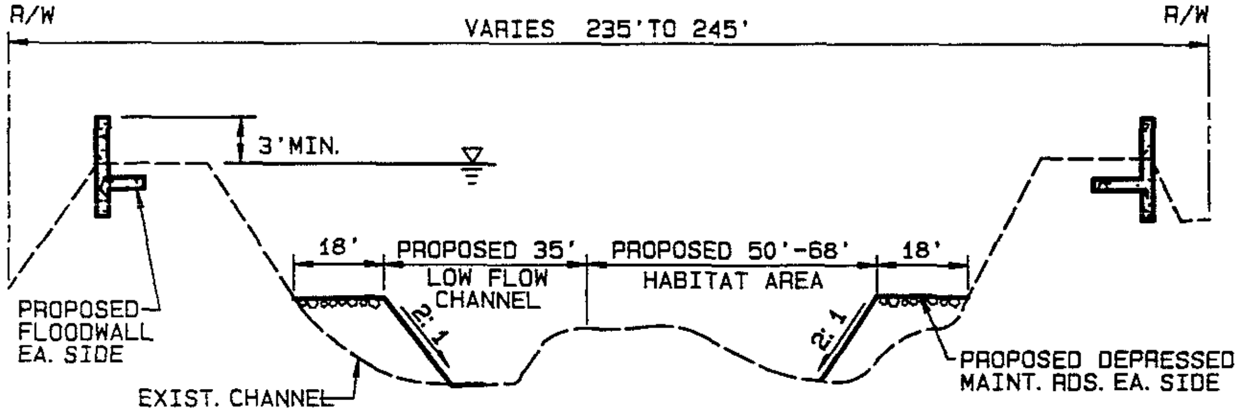


TYPICAL SECTION Z
Calabazas Creek
(Station 43+00 to Station 48+80)

REACH 11: Upstream Old Mountain View-Alviso Road to Upstream Tasman Drive

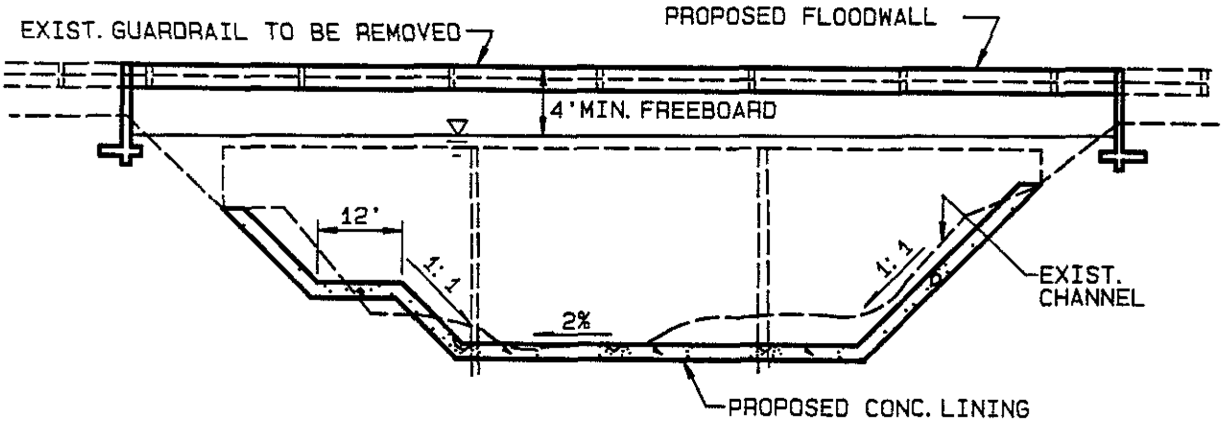


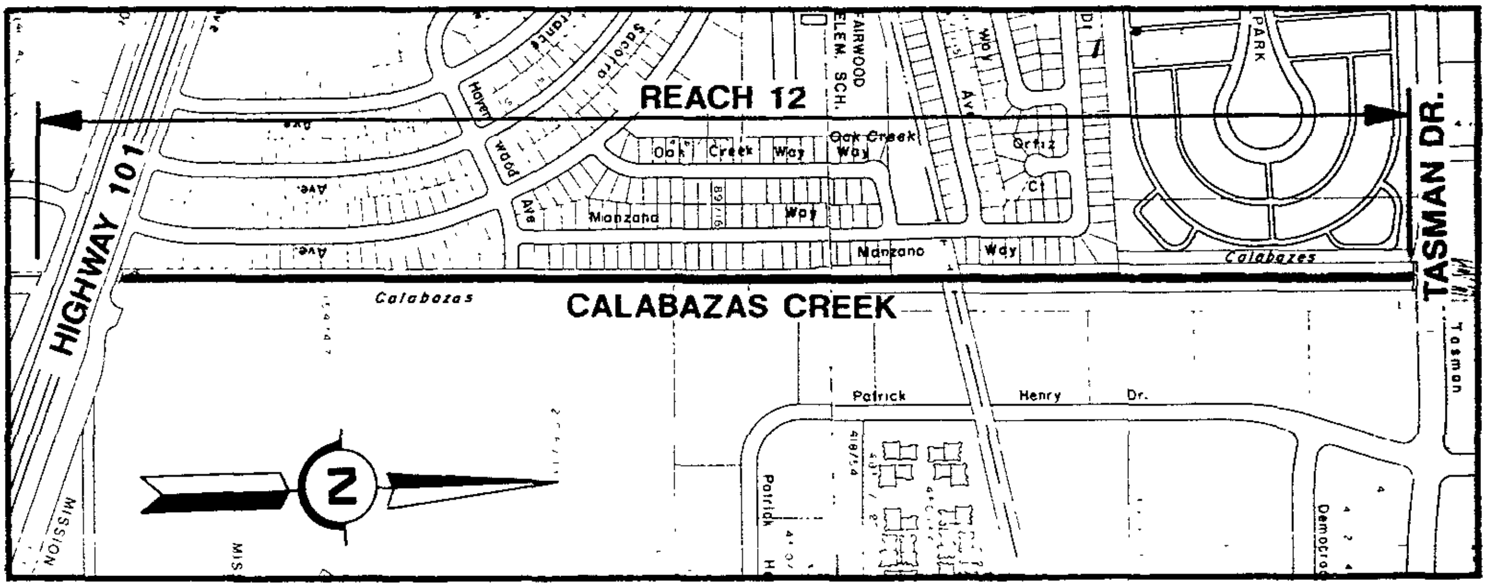
Floodwall Alternative



TYPICAL SECTION AA
Calabazas Creek
Tasman Drive Bridge

Reach 11: Upstream Old Mountain View-Alviso Road to Upstream Tasman Drive





REACH 12: Upstream of Tasman Drive to Upstream of Highway 101

Reach 12 extends from upstream of Tasman Drive to upstream of Highway 101 for a length of 5,550 feet. The straight excavated earth channel includes a low flow channel and an elevated floodplain bench and is contained by levees. Adjacent land uses are residential, commercial, industrial, and public school facilities. The right of way is 156 to 188 feet wide, and will accommodate all proposed measures.

Proposed Measures

The proposed project consists of constructing earth levees, concrete floodwalls, and maintenance roads. These measures would provide 1 percent flood flow capacity and improved maintenance efficiency and access.

The proposed flood control measures include reconstructing a portion of and raising by approximately 4 feet the easterly levee between Tasman Drive and the Mission College property. The rebuilt levee would include an embedded reinforcing material to allow steeper side slopes. The levee design may be modified or the concrete floodwall alternative may be substituted, depending upon the final recommendations of the geotechnical investigation. Adjacent to the Mission College property a low concrete floodwall would be constructed at the outside toe of the existing berm. A concrete floodwall would be constructed along the entire west bank. The floodwall would extend 4 to 8 feet above existing ground and would be constructed adjacent to existing fences along the property line. The existing western levee would be lowered so that pedestrians would no longer have a view of private yards.

A 15-foot wide maintenance road would be provided along both the westerly top of bank and the easterly levee. All maintenance roads would be surfaced with crushed rock to provide a wearing surface.

At the Hetch Hetchy pipeline crossing, (approximately 1,900 feet upstream of Tasman Road) an access ramp and a low levee would be tied into the floodwall on the west bank. A gate and fencing will also be provided. Flap gates would be installed at all storm drain outfalls in this reach.

A 36-inch PG&E gas line, located approximately 700 feet upstream of the Hetch Hetchy Aqueduct crossing, will be lowered by the District and the berm which covers it will be removed.

Along the westerly bank a narrow existing habitat area would be preserved. Within this specified corridor, growth would be unrestricted. This will eliminate a costly maintenance activity and improve habitat quality.

Typical Sections BB and CC show these proposed measures with their equivalent alternative.

Vegetation and Wildlife

The existing channel was designed to function properly with a minimum amount of vegetation in the flow area. Since its construction, the amount of vegetation has varied depending upon maintenance frequency. Current maintenance practice is to keep the channel free of significant or mature vegetation which would impede flows.

The following observations were made during vegetation and wildlife surveys on March 19, September 1, and November 2, 1988. Upstream from Tasman Avenue, Calabazas Creek shows relatively little tidal influence. As in Reach 11, the low flow channel is close to the west levee. The only vegetated section of Reach 12 is the narrow border of riparian scrub forest and emergent wetland vegetation on the western levee. The broad floodplain and levee slope east of the channel was completely cleared of vegetation in September and October 1988, as part of the SCVWD regular vegetation clearing program.

Impacts

Temporary biological impacts due to maintenance activities would be similar to those in Reach 9. Levee reconstruction may also impact existing landscaping located near the toe on the outboard side of the existing levee. The impact to existing landscaping would be minimal.

Burrowing owls are not known to currently inhabit the Calabazas Creek levees. Eliminating a burrowing owl burrow could be a potentially significant wildlife impact.

An aesthetic impact would result from floodwall construction. The proposed floodwall on the west bank will extend above some backyard fences and be visible to residents. The height above existing fences will vary from about 18 inches just south of Tasman Drive to 0 inches 2,500 feet upstream. The proposed floodwall on the west bank will be visible from the Mission College Road immediately adjacent to the creek.

There will be traffic impacts on Mission College Road immediately adjacent to the creek during floodwall construction.

A significant archaeological site may exist adjacent to the creek near the Mission College Campus (Appendix Q). Excavation for floodwall construction could impact this site.

Mitigation

The post project maintenance program will be less intense than the current one. The channel has been designed to ultimately accommodate a greater amount of vegetation within the right of way than now exists without compromising flood protection.

In order to mitigate for impacts to wildlife, vegetation clearing and construction activities would not begin until after July 1, when most species have completed the breeding season. Survey for borrowing owls would be conducted prior to levee reconstruction. If burrowing owls are found, a detailed plan for their relocation will be developed. The relocation site, the location methodology, and a monitoring program will be determined with assistance from the California Department of Fish and Game.

The exterior side of floodwalls will be architecturally treated to soften their visual impact. Details of proposed mitigation for biological and aesthetic impacts are included in the chapter entitled "Significant Environmental Impacts and Proposed Mitigation Measures."

Prior to construction, a traffic plan will be developed to minimize disruption to traffic and insure proper safety precautions.

In order to avoid impacts to archaeological resources, excavation for floodwall construction will be monitored by a qualified archaeologist.

Monitoring

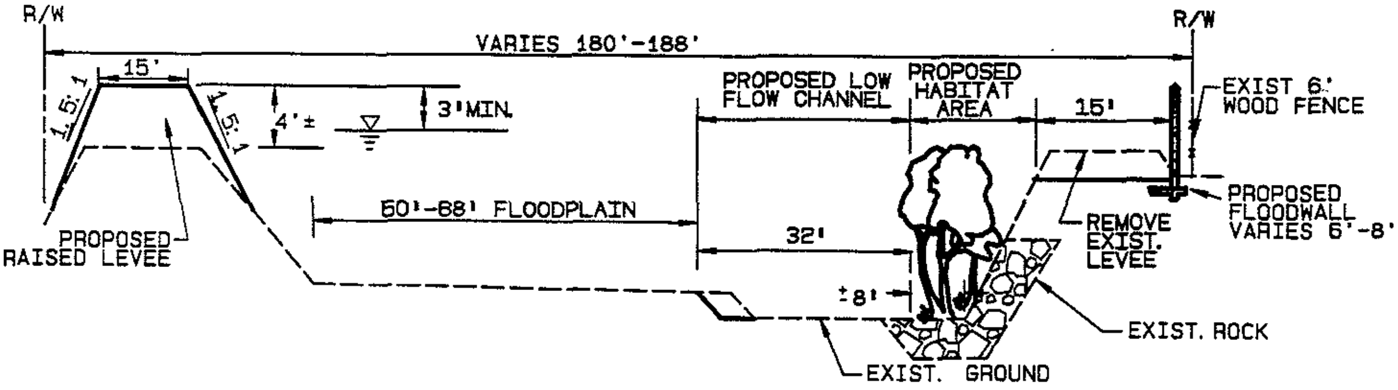
Detailed plans and specifications for mitigation and avoidance will be developed by the District. District inspectors will oversee implementation to insure conformance to the specifications. A monitoring program is included in Appendix S.

Costs

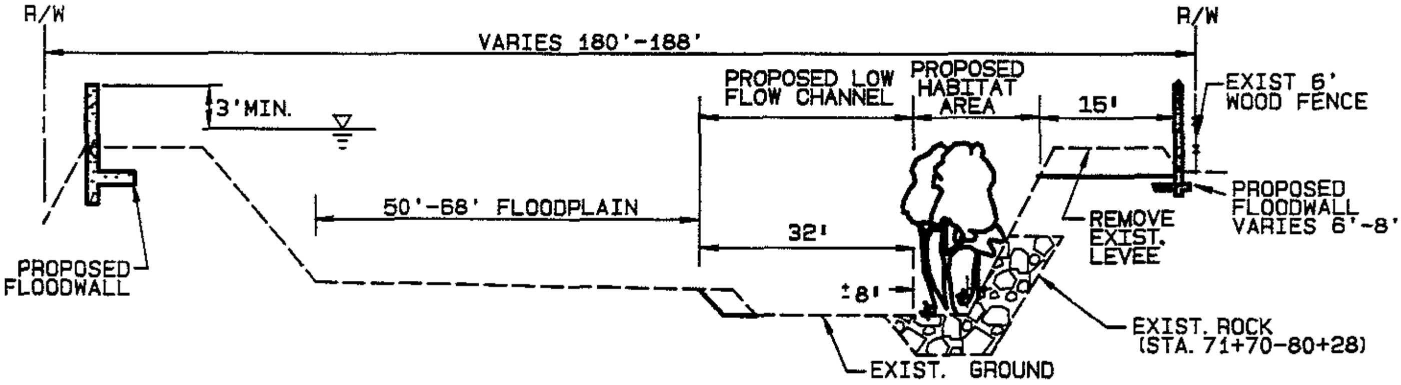
The total estimated project cost in Reach 12 is $1,848,648. A detailed cost estimate is included in Appendix F.

TYPICAL SECTION BB
Calabazas Creek
(Station 50+25 to Station 80+28)

REACH 12: Upstream Tasman Drive to Upstream Highway 101

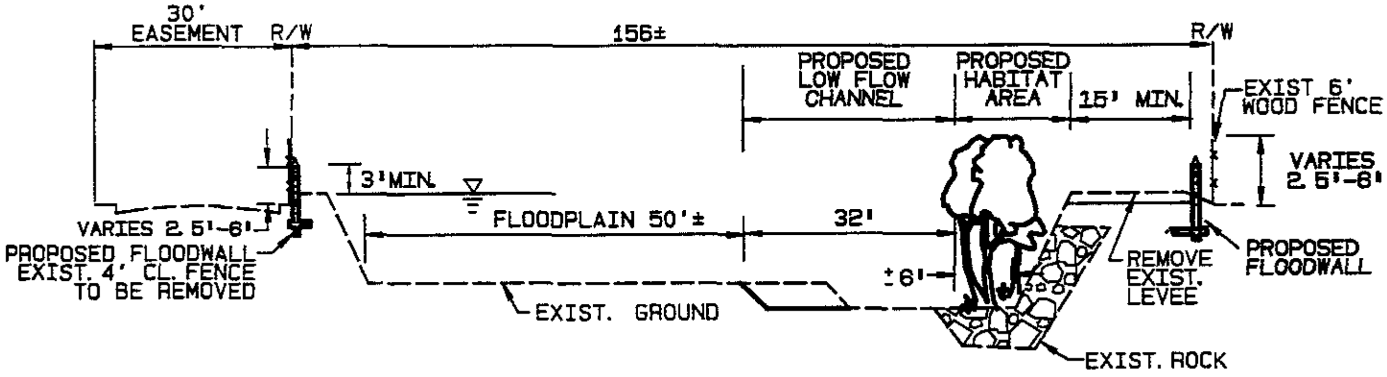


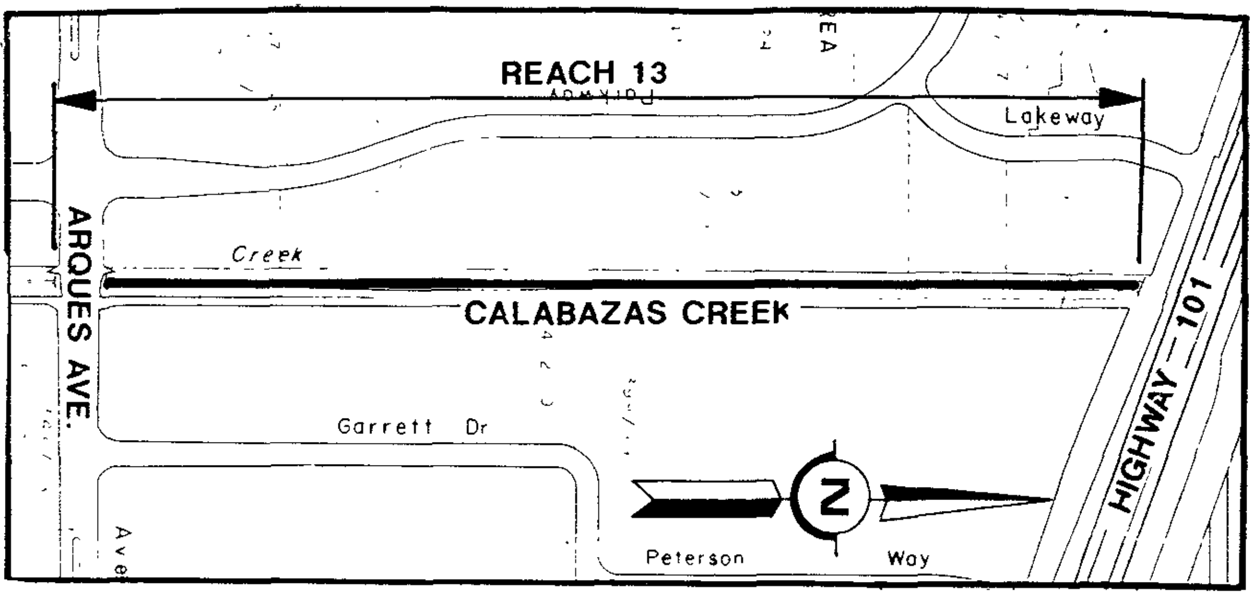
Floodwall Alternative



TYPICAL SECTION CC
Calabazas Creek
(Station 80+60 to Station 101+80)

REACH 12: Upstream Tasman Drive to Upstream Highway 101





REACH 13: Upstream of Highway 101 to Upstream of Arques Avenue

Reach 13 extends from upstream of Highway 101 to upstream of Arques Avenue for a total length of 2,700 feet. The creek is a trapezoidal concrete-lined channel. Adjacent land uses are industrial and commercial. The right of way is 120 feet wide and will accommodate all proposed measures. There are known soil contamination sites in the vicinity of this reach. Appendix U provides information about those sites and a management plan.

Proposed Measures

The proposed project consists of constructing earth levees, concrete retaining walls and floodwalls, concrete channel lining and access ramps, and maintenance roads. These measures would provide 1 percent flood flow capacity.

The proposed flood control measures include constructing a levee on either side of the existing concrete-lined channel. The levee would vary in height from 5 feet near Highway 101 to 0 feet (existing grade) approximately 1,700 feet upstream. The in-board sides of the proposed levees would be concrete-lined to form an extension of the existing concrete-lined channel. The outboard side of westerly levee from Highway 101 for 200 feet upstream would require a concrete retaining wall. Maintenance roads would be constructed on top of the proposed levee and would be accessed by ramps from Lakeside Drive. All maintenance roads would be surfaced with crushed rock to provide a wearing surface.

The steel railing on the culvert at Lakeside Drive would be replaced by a 5-foot high concrete floodwall. 42-inch chain-link fences would be constructed at the inboard side of the levees. Typical Sections DD and EE show these proposed improvements.

Impacts

There will be no significant impact on wildlife or vegetation. Some landscaping from adjacent areas which has grown into the right of way may be impacted. The impact to existing landscaping would be minimal.

An aesthetic impact would result from floodwall construction.

There will be traffic impacts on Lakeside Drive during floodwall construction.

Mitigation

The exterior side of floodwalls will be architecturally treated to soften their visual impact. Details of proposed mitigation for biological and aesthetic impacts are included in the chapter entitled "Significant Environmental Impacts and Proposed Mitigation Measures."

Prior to construction, a traffic plan will be developed to minimize disruption to traffic and insure proper safety precautions.

Monitoring

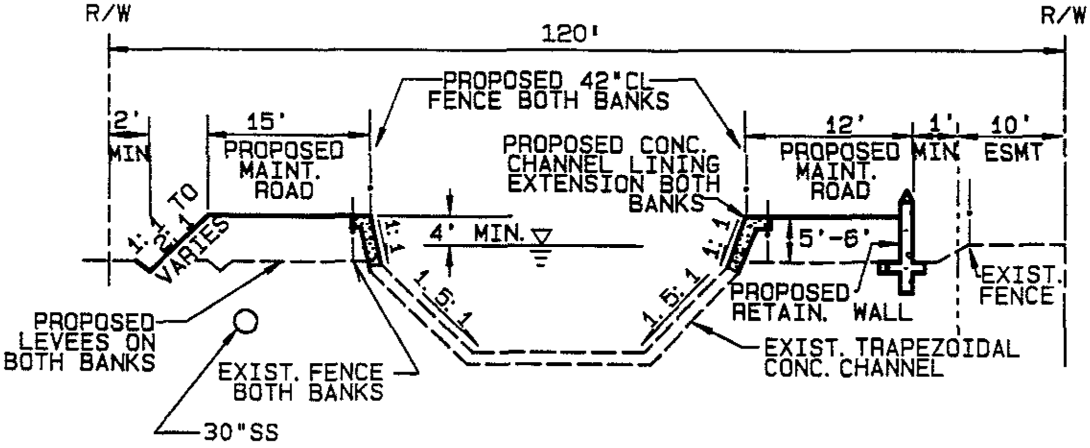
Detailed plans and specifications for mitigation will be developed by the District. District inspectors will oversee implementation to insure conformance to the specifications. A monitoring program is included in Appendix S.

Costs

The total estimated project cost in Reach 13 is $400,589. A detailed cost estimate is included in Appendix F.

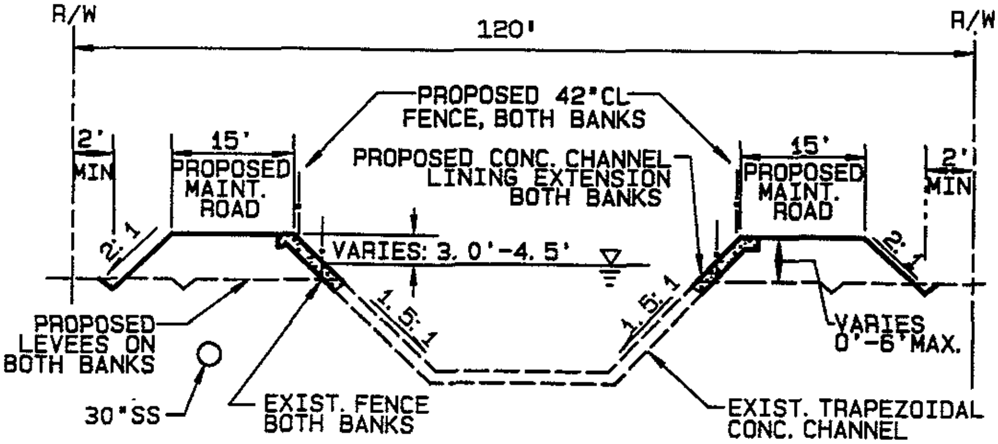
TYPICAL SECTION DD
Calabazas Creek
(Station 106+22 to Station 108+45)

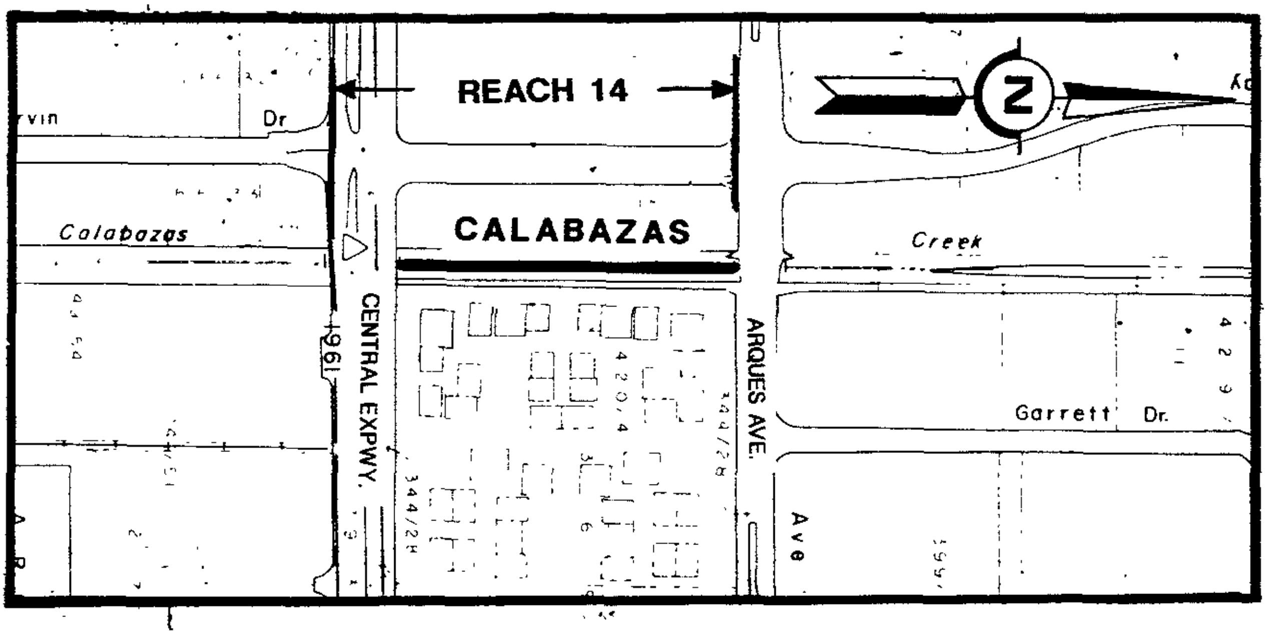
REACH 13: Upstream Highway 101 to Upstream Scott Boulevard



TYPICAL SECTION EE
Calabazas Creek
(Station 108+45 to Station 124+00)

REACH 13: Upstream Highway 101 to Upstream Scott Boulevard

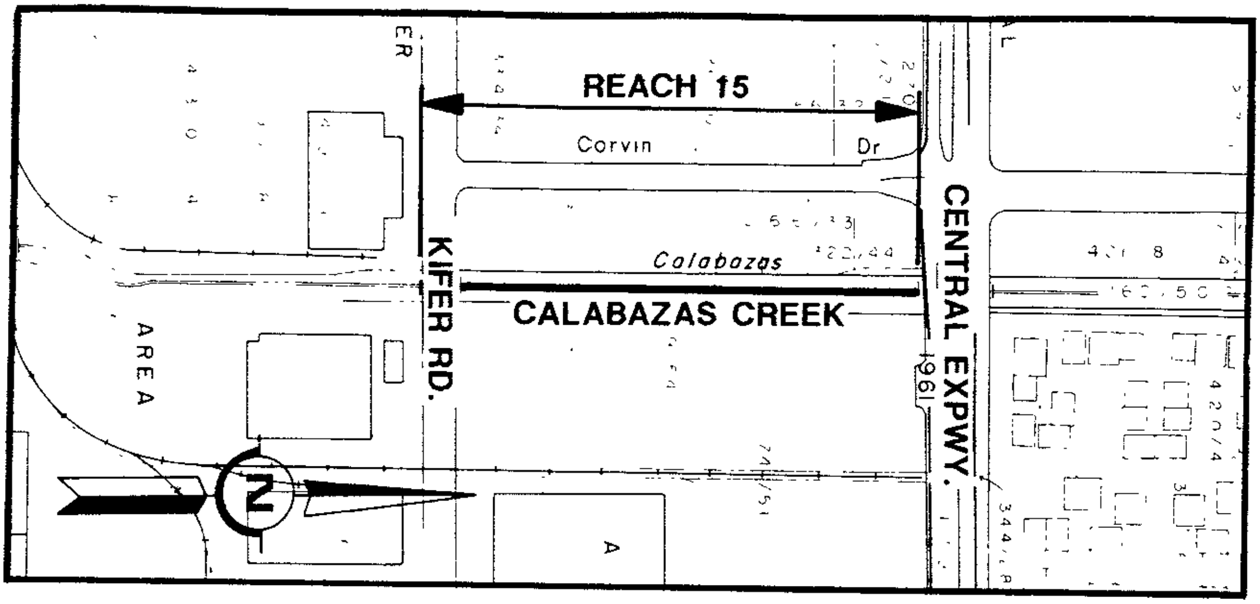




REACH 14: Upstream of Arques Avenue to Upstream of Central Expressway

Reach 14 extends from upstream of Arques Avenue to upstream of Central Expressway.

No modifications are proposed for this reach because the channel adequately conveys the 1 percent flood flow.



REACH 15: Upstream of Central Expressway to Upstream of Kifer Road

Reach 15 extends from upstream of Central Expressway to upstream of Kifer Road for a total length of 1,350 feet. The creek is a trapezoidal concrete-lined channel. Adjacent land uses are industrial. The right of way varies from 100 feet to 115 feet wide and will accommodate all proposed measures. An archaeological site has been identified near Central Expressway (Appendix Q). There are known soil contamination sites in the vicinity of this reach. Appendix U provides information about those sites and a management plan.

Proposed Measures

The proposed project consists of constructing floodwalls, extending the concrete channel linings, constructing concrete access ramps and replacing the existing reinforced concrete box culvert at Kifer Road with a clear span bridge and trapezoidal concrete channel. These measures would provide 1 percent flood flow capacity.

The proposed flood control measures include constructing concrete floodwalls on each channel bank. The flood walls would vary in height from 3 feet at Central Expressway to 0 feet (existing grade) at Kifer Road. The sides of the existing concrete-lined channel would be extended to the top of channel bank where they would conform with the proposed floodwall. A 5-foot high concrete floodwall would be constructed on the upstream face of the existing Central Expressway culvert. The existing access ramps to the channel bottom would be raised to provide access over the proposed floodwalls. A chain-link fence would be provided on top of the floodwalls.

A maintenance road of varying width would be provided along the westerly top of bank. All maintenance roads would be surfaced with crushed rock to provide a wearing surface.

The culvert replacement involves the demolition of the Kifer Road culvert and construction of a clear span bridge. A trapezoidal concrete channel would be constructed beneath the proposed bridge to match upstream and downstream concrete trapezoidal channels. Any utilities affected would be relocated at District cost unless, by a previous agreement, the owner is responsible for those costs.

Typical Sections FF, GG, and HH show these proposed improvements.

Impacts

There will be no significant impact on wildlife or vegetation. An aesthetic impact would result from floodwall construction. There will be traffic impacts on Kifer Road during demolition of the existing culvert and construction of a clear span bridge. There will also be traffic impacts on Central Expressway during floodwall construction.

A significant archaeological site may exist adjacent to the creek near Central Expressway. Excavation could impact this site.

Mitigation

The exterior side of floodwalls will be architecturally treated to soften their visual impact. Details of proposed mitigation for aesthetic impacts are included in the chapter entitled "Significant Environmental Impacts and Proposed Mitigation Measures."

Prior to construction, a traffic plan will be developed to minimize disruption to traffic and insure proper safety precautions.

In order to avoid impacts to archaeological resources, excavation will be monitored by a qualified archaeologist.

Monitoring

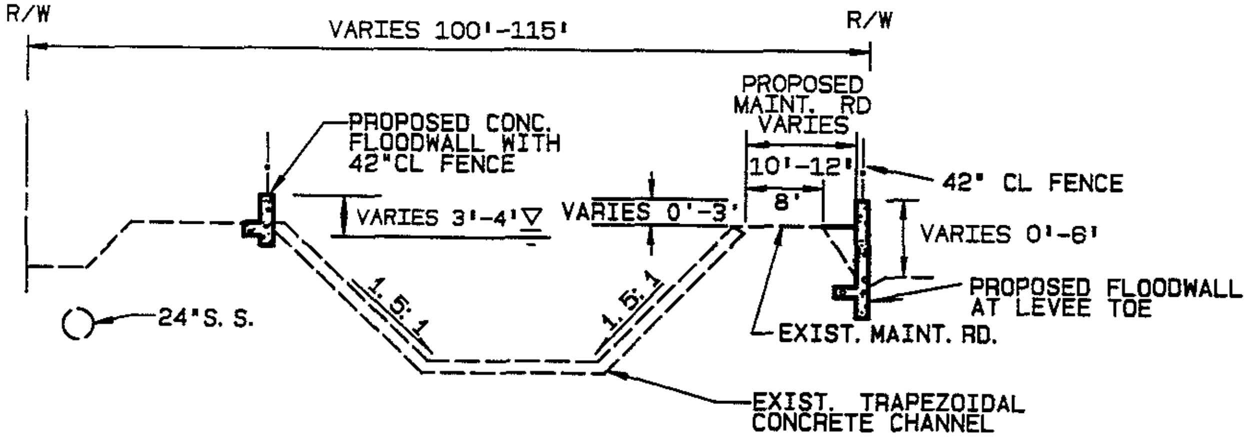
Detailed plans and specifications for mitigation will be developed by the District. District inspectors will oversee implementation to insure conformance to the specifications. A monitoring program is included in Appendix S.

Costs

The total estimated project cost in Reach 15 is $1,414,685. A detailed cost estimate is included in Appendix F.

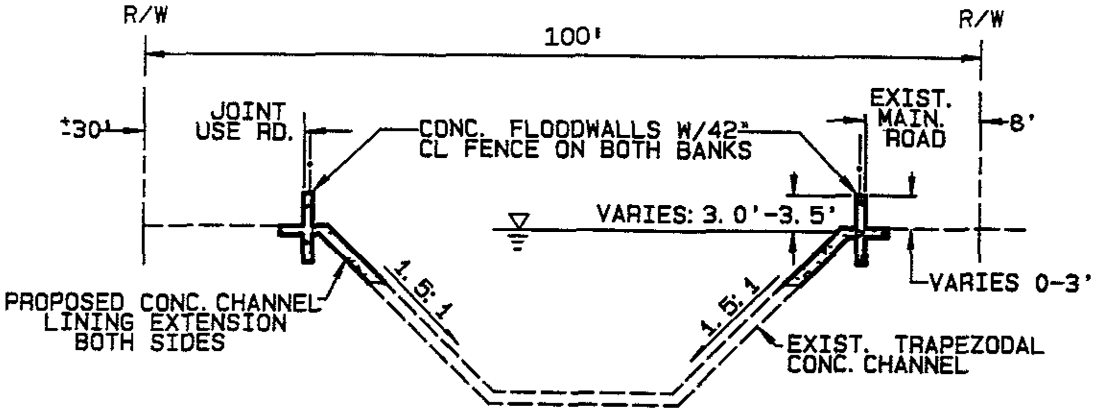
TYPICAL SECTION FF
Calabazas Creek
(Station 144+52 to Station 150+80)

REACH 15: Upstream Central Expressway to Upstream Kifer Road


R/W
VARIES 100'-115'
R/W
PROPOSED MAINT. RD VARIES
PROPOSED CONC. FLOODWALL WITH 42"CL FENCE
10'-12'
42" CL FENCE
8'
VARIES 3'-4'
VARIES 0'-3'
VARIES 0'-6'
1.5:1
1.5:1
PROPOSED FLOODWALL AT LEVEE TOE
24"S. S.
EXIST. MAINT. RD.
EXIST. TRAPEZOIDAL CONCRETE CHANNEL

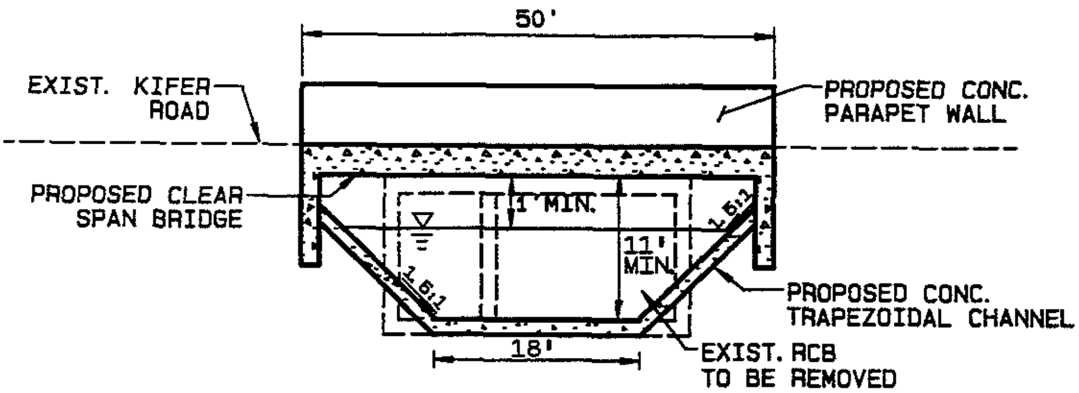
TYPICAL SECTION GG
Calabazas Creek
(Station 150+80 to Station 156+80)

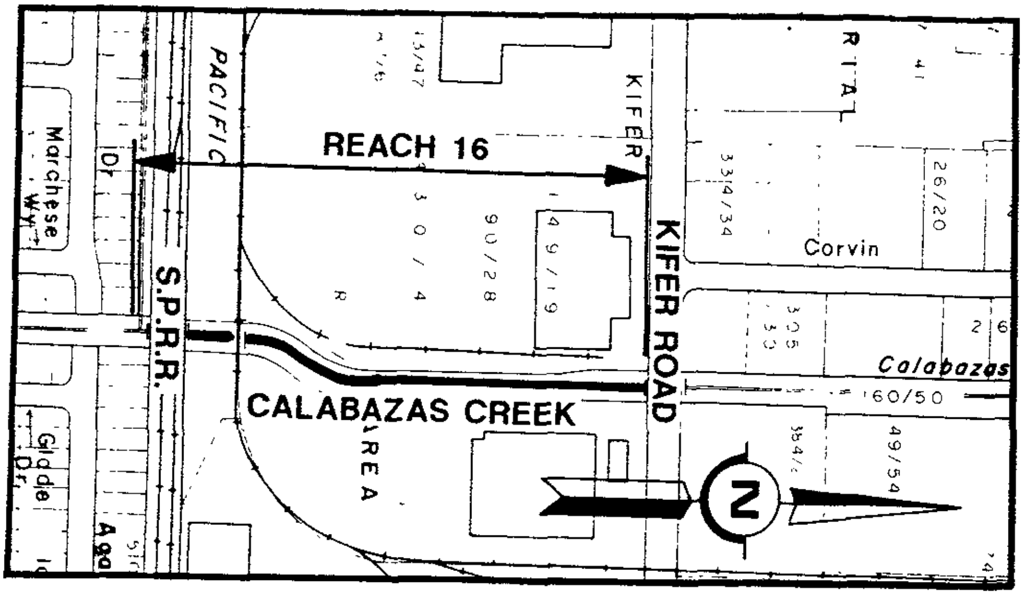
REACH 15: Upstream Central Expressway to Upstream Kifer Road


R/W
100'
R/W
±30'
JOINT USE RD.
CONC. FLOODWALLS W/42" CL FENCE ON BOTH BANKS
EXIST. MAIN. ROAD
8'
VARIES: 3.0'-3.5'
1.5:1
1.5:1
VARIES 0-3'
PROPOSED CONC. CHANNEL LINING EXTENSION BOTH SIDES
EXIST. TRAPEZODAL CONC. CHANNEL

TYPICAL SECTION HH
Calabazas Creek
Kifer Road Clear Span Bridge

REACH 15: Upstream Central Expressway to Upstream Kifer Road


50'
EXIST. KIFER ROAD
PROPOSED CONC. PARAPET WALL
PROPOSED CLEAR SPAN BRIDGE
1' MIN.
1.5:1
11' MIN.
1.5:1
PROPOSED CONC. TRAPEZOIDAL CHANNEL
18'
EXIST. RCB TO BE REMOVED



REACH 16: Upstream of Kifer Road to the Upstream of the Southern Pacific Railroad

Reach 16 extends from upstream of Kifer Road to upstream of the Southern Pacific Railroad (SPRR) for a total length of 1,300 feet. The creek is a trapezoidal concrete-lined channel up to the 230-foot long double-reinforced concrete box culvert under the railroad. There are known soil contamination sites in the vicinity of this reach. Appendix U provides information about those sites and a management plan.

Proposed Measures

The proposed project consists of relocating the confluence of Calabazas Creek and the El Camino Storm Drain to the downstream side of the SPRR. This would include realigning the El Camino Storm Drain into a rectangular reinforced concrete box culvert under the SPRR, constructing a short section of vertical walled concrete channel upstream of the new culvert and structural modifications to the existing Calabazas Creek/El Camino Storm Drain confluence. These measures would provide 1 percent flood flow capacity in Calabazas Creek and El Camino Storm Drain.

Typical Section II shows the proposed measures for this reach.

Impacts

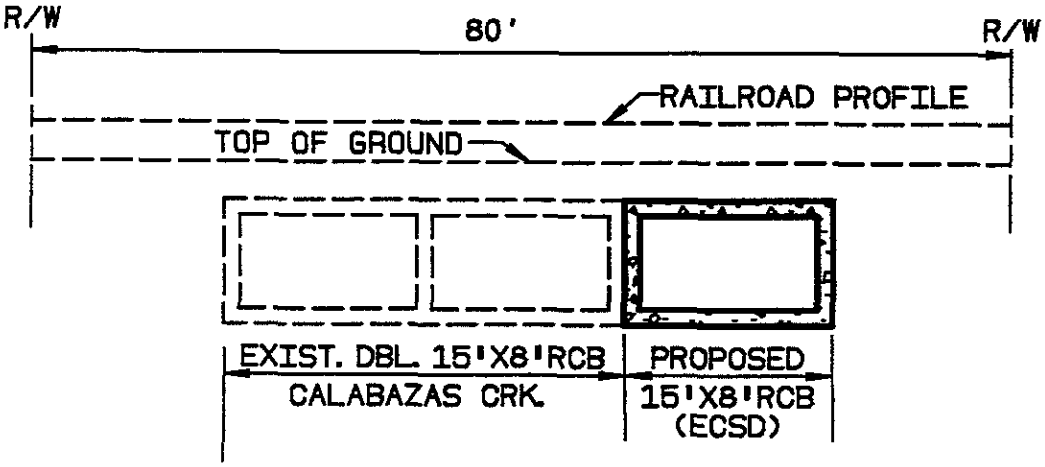
There will be no significant impacts in Reach 16.

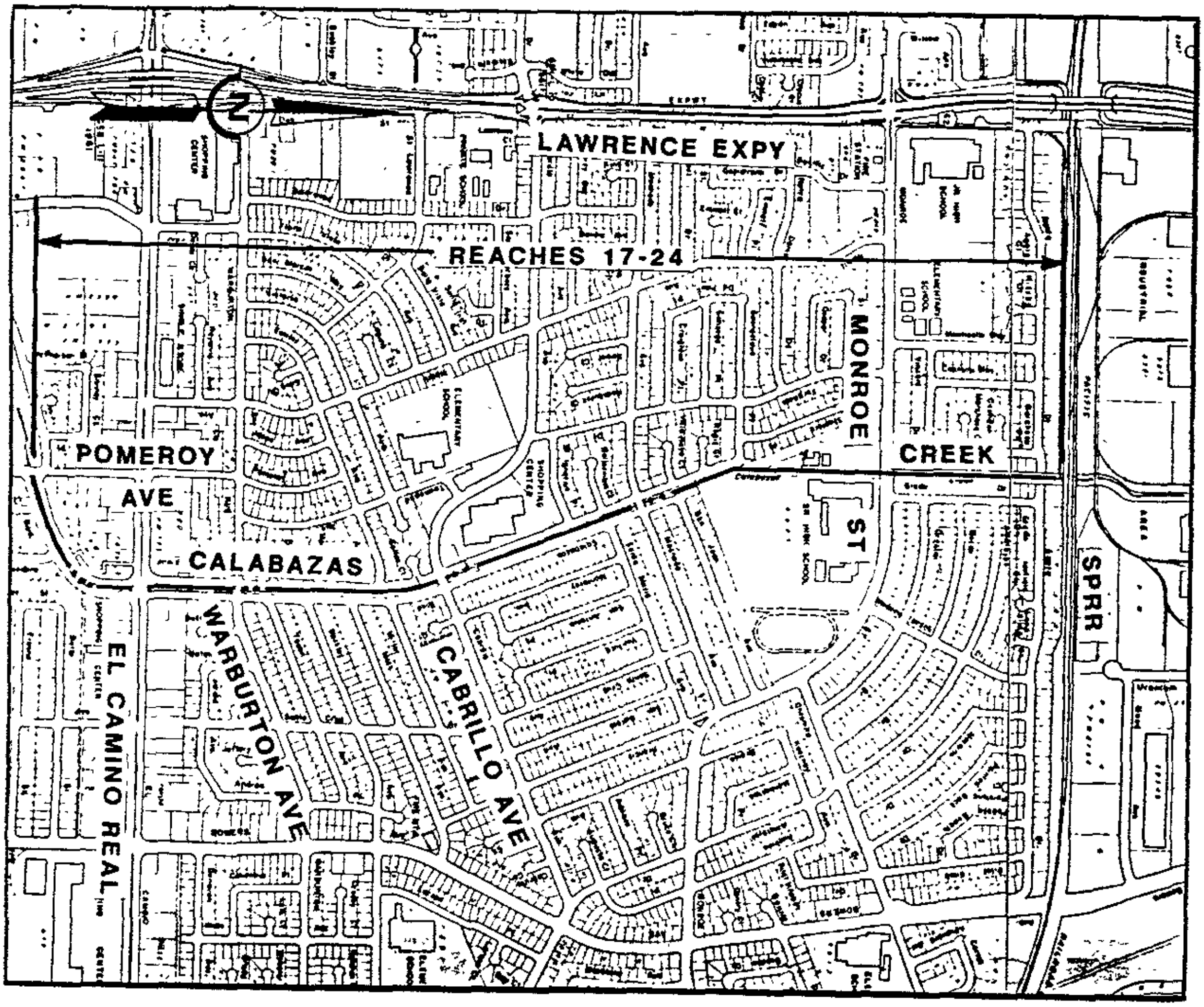
Costs

The total estimated project costs in Reach 16 and Reach 16A is $691,200. A detailed cost estimate is included in Appendix F.

TYPICAL SECTION II
Calabazas Creek
(Station 0+00 to Station 2+35)

REACH 16A: El Camino Storm Drain, Confluence to 400 Feet Upstream

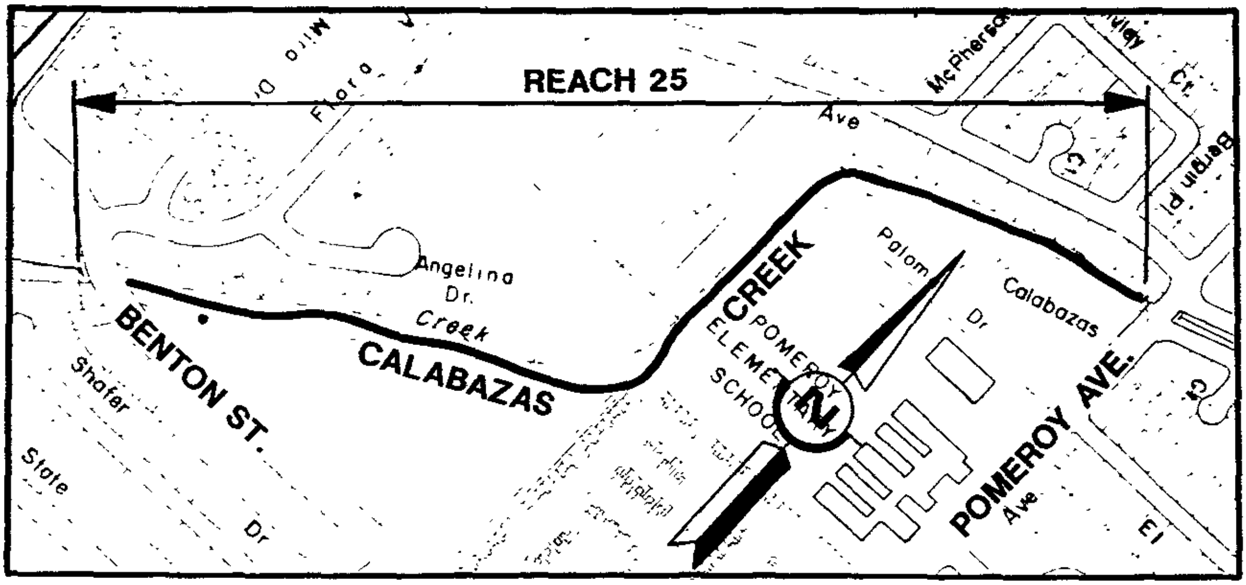




REACHES 17 THROUGH 24: Upstream of the Southern Pacific Railroad to Upstream of Pomeroy Avenue

Reaches 17 through 24 extend from upstream of the SPRR to upstream of Pomeroy Avenue.

No modifications are proposed for these reaches because the channel adequately conveys the 1 percent flood flow.



REACH 25: Upstream of Pomeroy Avenue to Upstream of Benton Street

Reach 25 extends from upstream of Pomeroy Avenue to upstream of Benton Avenue for a total length of 3,200 feet. The creek is a trapezoidal concrete channel. Adjacent land use is residential and public facilities (schools and parks). The right of way is 70 feet wide and will accommodate all of the proposed measures.

Proposed Measures

The proposed project consists of construction of floodwalls and concrete channel lining extensions and reconstruction of the Pomeroy Avenue culvert transition. These measures would provide 1 percent flood flow capacity.

The proposed measures include the demolition and reconstruction of the southeasterly inlet transition of the Pomeroy Avenue reinforced concrete box culvert to improve flow performance and the construction of concrete floodwalls at the southerly parapet wall of the Pomeroy Culvert and on both channel banks for a distance of 700 feet upstream. Typical Section JJ shows the proposed improvements for this reach.

Impacts

There will be no significant impact on wildlife or vegetation. An aesthetic impact would result from floodwall construction. There will be traffic impacts on Pomeroy Avenue during floodwall construction and culvert modification.

Mitigation

The exterior side of floodwalls will be architecturally treated to soften their visual impact. Details of proposed mitigation for aesthetic impacts are included in the chapter entitled "Significant Environmental Impacts and Proposed Mitigation Measures."

Prior to construction, a traffic plan will be developed to minimize disruption to traffic and insure proper safety precautions.

Monitoring

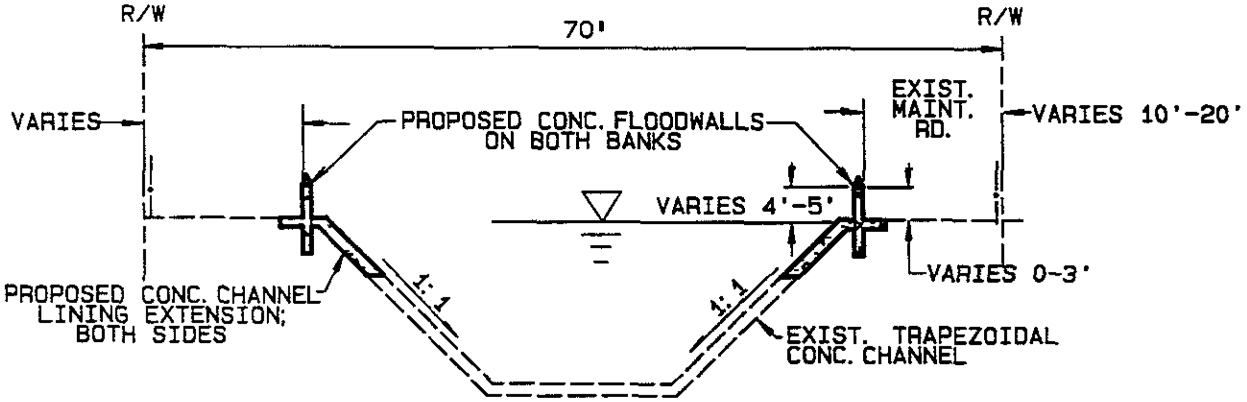
Detailed plans and specifications for mitigation will be developed by the District. District inspectors will oversee implementation to insure conformance to the specifications. A monitoring program is included in Appendix S.

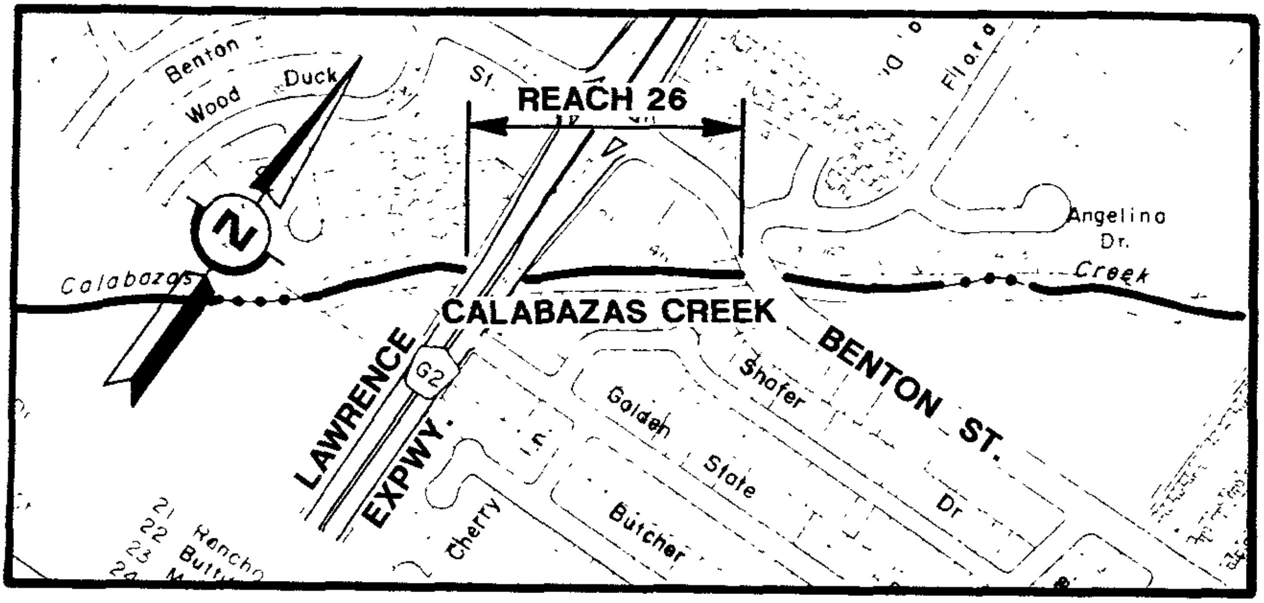
Costs

The total estimated project cost in Reach 25 is $153,144. A detailed cost estimate is included in Appendix F.

TYPICAL SECTION JJ
Calabazas Creek
(Station 251+40 to Station 258+75)

REACH 25: Upstream Pomeroy Avenue to Upstream Benton Avenue


R/W
70'
R/W
VARIES
PROPOSED CONC. FLOODWALLS ON BOTH BANKS
EXIST. MAINT. RD.
VARIES 10'-20'
VARIES 4'-5'
VARIES 0-3'
1:1
1:1
PROPOSED CONC. CHANNEL LINING EXTENSION; BOTH SIDES
EXIST. TRAPEZOIDAL CONC. CHANNEL



REACH 26: Upstream of Benton Street to Upstream of Lawrence Expressway

Reach 26 extends from upstream of Benton Avenue to upstream of Lawrence Expressway.

No modifications are proposed for this reach because the channel adequately conveys the 1 percent flood flow and is not experiencing any significant problems.

MAINTENANCE PROGRAM

To ensure the integrity and effective operation of the proposed flood control measures, a maintenance program is necessary. In this chapter, anticipated maintenance activities are described and guidelines to determine when channel cleaning is necessary are presented. Upon completion of construction, the activities and standards listed in this chapter would supersede the existing maintenance program and the current Memorandum of Understanding with the California Department of Fish and Game (Appendix V). In general, the maintenance activities would be similar to those currently practiced but less frequent.

MAINTENANCE ACTIVITIES

Goals of the maintenance program include keeping the channel sufficiently clear to provide 1 percent flood capacity at all times, eliminating hazardous conditions and repairing the facility as necessary. General tasks to be performed during annual maintenance operations include fence repairs, trash removal, weed control, and elimination of any potentially hazardous conditions. Annual inspection and periodic repair of gabion baskets, removal of sediments and vegetation in the waterway, and restoration of abraded concrete will also be necessary. Routine maintenance operations are usually performed during the summer or early fall. Vegetation removal will be scheduled to minimize adverse impacts to fish and wildlife resources. Periods of concern are March through June for birds and October through March for fish.

Following is an explanation of the recommended maintenance program guidelines for specific reaches.

Reaches 1A, 1C, 2, 3B, 4, 5

Annual maintenance activities would include repair of damaged gabion baskets, restoration of scoured areas in the channel bottom, removal of large debris in the waterway, and weed control. All debris would be removed from culvert entrances when it accumulates.

Periodic maintenance activities would include removal of woody vegetation and sediment from the waterway as described in the Maintenance Standards, Table 7, which is located at the end of this chapter. Concrete structures would be inspected for abrasion and restored as necessary. Fencing would be repaired as necessary.

Channel access would be from ramps which are proposed to be constructed at each road crossing.

Reach 1B

Annual and periodic maintenance activities would occur in the gabion-lined bypass channel and in the existing natural channel.

The annual and periodic maintenance activities for the gabion-lined bypass channel would be the same as for Reaches 1A and 1C.

Annual maintenance activities for the existing natural channel would involve addressing potentially hazardous conditions which may affect the integrity of the channel banks and downstream channel capacity. The hazardous conditions include large dying or fallen trees, eroding or sloughing channel banks, excessive debris build up in the waterway area and wear to the diversion structure.

The periodic maintenance would include remedial measures to arrest erosion and selective channel clearing as described in Table 7. Sediment and vegetation removal would rarely be necessary in the undisturbed section.

Channel access would be from a ramp 700 feet upstream of Lawrence Expressway on the west bank and a ramp near the diversion on the west bank. The ramps would be accessed from ingress and egress easements to Benton Street and Vireo Avenue. If the adjacent orchard lands were to be developed, the ingress and egress easements could be abandoned in favor of access provided through the development.

Reach 3A

Annual maintenance activities would include inspection and repair of damaged gabion baskets, restoration of scoured areas in the channel bottom and removal of large debris in the waterway.

Periodic maintenance activities would include removal of woody vegetation and sediment from the westerly portion of the channel area, as described in Table 7. No sediment or vegetation removal would be required within 15 feet of the toe of the east bank. Channel access would be from ramps at Homestead Road and Pruneridge Avenue.

Reach 6

Annual maintenance activities would include restoration of scoured areas in the channel bottom or sides, replacement of displaced rock lining and removal of silt and debris from the waterway.

Periodic maintenance activities would include removal of woody vegetation and sediment from the waterway. These operations would take place where sediment depths exceed 2 feet or woody vegetation grows over 3 feet high.

Channel access would be from ramps at Vallco Parkway.

Reach 7

Periodic maintenance would primarily consist of sediment removal from the buried box culverts. Sediment removal should take place where over 1 foot of material has accumulated.

The box culverts should be inspected for abrasion and restored as necessary.

Reach 8

Annual maintenance activities would include repair of damaged gabion baskets, restoration of scoured areas in the channel bottom, and removal of large debris in the waterway. All debris should be removed from culvert entrances when it accumulates.

Periodic maintenance activities would include removal of woody vegetation and sediment as described in Table 7. Concrete structures would be inspected for abrasion and repaired as necessary. Fencing would be repaired as necessary.

Channel access would be from a ramp constructed on the east bank approximately 500 feet downstream of Miller Avenue.

Reach 9

Annual maintenance activities would include repair of maintenance roads, weed abatement on maintenance roads and levees, and removal of silt and vegetation from the low flow channel if required.

Maintenance activities are not required in the habitat area. Growth of woody vegetation is not expected in this reach because of salinity. Sediment deposition in the habitat area above elevation 7 is not expected to occur at all. Channel borne sediments are typically deposited upstream and tidally borne sediments are not deposited above about elevation 6. Maintenance standards are listed in Table 7.

Reach 10

Annual maintenance activities would include repair of depressed maintenance roads, weed abatement on depressed maintenance roads and levees, and removal of silt and vegetation from the low flow channel if required.

Periodic maintenance activities would include removal of woody vegetation and silt from the habitat area. Sparse woody vegetation is expected. Sediment deposition in the habitat area above the acceptable level of elevation 7 is expected to be infrequent or not to occur at all. It is expected that removal of woody vegetation and sediments from the habitat areas will seldom be required. Maintenance standards are listed in Table 7.

Reach 11

Annual maintenance activities would include repair of depressed maintenance roads, weed abatement on depressed maintenance roads and levees, and removal of silt and vegetation from the low flow channel if required.

Periodic maintenance activities would include removal of woody vegetation and silt from the habitat area. The amount of woody vegetation in the habitat area is expected to vary from sparse near Old Mountain View-Alviso Road to very dense downstream of Tasman Drive. Selective clearing of woody vegetation in excess of 8 feet high or with trunk diameter greater than 3 inches would be required. Some channel borne sediments are expected to be deposited in the habitat area downstream of Tasman Drive. Removal of sediments above elevation 7 feet in the habitat area within 1,000 feet of Tasman Drive is expected to be necessary every 4 or 5 years. For the remainder of the habitat area, a lower sediment removal frequency is expected. Maintenance standards are listed in Table 7.

Reach 12

Annual maintenance activities would include repair of maintenance roads and weed abatement on maintenance roads and levees.

Periodic maintenance activities would include removal of silt and vegetation from the low flow channel and the floodplain. Vegetation and sediment would be removed from the low flow channel every 2 years. Vegetation in the floodplain would be mowed or crushed every 2 years. Sediments would be removed from the floodplain area when the depth reaches 1 foot. This is expected to be required every 3 years on the average. Maintenance activities in the habitat area are limited to removal of downed trees and debris that could impede flood flows. All other maintenance activities are prohibited in the habitat area. Maintenance standards are listed in Table 7.

Reaches 13-26

Annual maintenance activities would consist primarily of weed abatement within the District's right of way.

Periodic maintenance activities would include sediment and debris removal and repair of facilities as necessary. Maintenance standards are listed in Table 7.

MAINTENANCE STANDARDS

The flow area of the proposed flood control channel would require periodic clearing. Maximum levels of sediment and vegetation which can be allowed within the flow area without jeopardizing the 1 percent design capacity have been identified during the hydraulic design. These maximum levels are called acceptable maintenance limits and are listed in Table 7.

TABLE 7
Calabazas Creek—Guadalupe Slough to Miller Avenue
Maintenance Standards for Sediment and Vegetation Removal

REACHES 1-5, 8: Lawrence Expressway to Hwy. 280 and Stevens Creek Boulevard to Miller Avenue

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Gabion Channel	Streambed scour	Expose 2′ of concrete cutoff wall	Place rock, restore bed
	Uniform sediments	Sediments above 1st gabion course (1.5′)	Remove sediments from the channel
	Local sediments (bars, sloughs, etc.)	Sediment bars above 2nd gabion course (3.0′)	Remove local sediments
	Local sediments with vegetation	Sediment bars above 1st gabion course (1.5′)	Remove local sediments and vegetation
	Woody vegetation below 3rd gabion course	Height of tallest woody vegetation exceeds 5′	Remove all woody vegetation below 3rd gabion only
	Brush, vines, etc. below 3rd gabion course	Height of tallest brush exceeds 4′	Cut brush below third gabion to 1′ or less
Natural Channel	Uniform sediment	Sediments 2′ above invert of adjacent bypass	Remove sediments from 10′ wide corridor
	Local sediment (bars, sloughs, etc.)	No limit	No maintenance required
	Woody vegetation	Woody vegetation occupies entire channel	Clear a 10′ corridor through congested areas
	Brush, vines, etc.	Dense brush/vines occupy entire channel	Clear a 10′ corridor through congested areas

TABLE 7
Calabazas Creek—Guadalupe Slough to Miller Avenue Maintenance Standards for Sedient and Vegetation Removal
(continued)

REACH 6: Hwy. 280 to Vallco Parkway

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Earth Channel Below Depressed Roads	Bank erosion	5′ from design condition	Restore eroded bank
	Uniform sediments	Sediments exceed 1′ deep (7′ below depressed road)	Remove sediments from the channel
	Local sediments (bars, sloughs, etc.)	Sediment bars exceed 3′ deep	Remove local sediments
	Local sediments with vegetation	Sediment bars exceed 2′ deep	Remove local sediments and vegetation
	Woody vegetation	Height of tallest woody vegetation exceeds 5′	Selectively remove woody vegetation
	Rock slope protection	Voids exceed five times rock diameter	Replace missing rock
Depressed Maintenance Roads	Vegetation on roads	No vegetation on roads	Preemergent spray
	Vegetation overhanging	Vegetation overhanging 6′ into roadway	Cut back overhanging vegetation to edge of maintenance road
Earth Slopes Above Maintenance Roads	Vegetation	No limit	

TABLE 7
Calabazas Creek—Guadalupe Slough to Miller Avenue Maintenance Standards for Sediment and Vegetation Removal (continued)

REACH 7: Vallco Parkway to Stevens Creek Boulevard

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Box Culverts	Sediments	Sediment elevations exceed 12″	Remove sediment
	Uniform surface Abrasion	Surface roughness variation exceeds .04″	Resurface
	Local surface abrasion	Erosion of 0.2′	Resurface

TABLE 7
Calabazas Creek—Guadalupe Slough to Miller Avenue
Maintenance Standards for Sediment and Vegetation Removal
(continued)

REACHES 9-11 Guadalupe Slough to Tasman Drive

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Low Flow Channel	Uniform sediments	Design top width decreased by 10′ or design invert increased by 3′	Remove sediments, restore design top width and depth
	Local sediments (bars, etc.)	Design top width decreased by 10′ invert increased by 4′	Remove local sediments restore design top width and depth locally
	Woody vegetation (willow, bamboo, etc.)	Height of tallest woody vegetation exceeds 6′	Remove all woody vegetation within low flow channel
	Flexible vegetation (cattails, bulrush)	No limit	No maintenance required
Habitat Area	Uniform sediments Sta. 0+00 to 25+00	No limit	No maintenance required
	Uniform sediments Sta. 25+00 to 49+00	Uniform sediment depth within 1′ of top of depressed maintenance road	Remove sediments to elevation 5 only within 50′ of the east levee
	Local sediments	Sediments above elevation 7.0	Remove local sediments to Elevation 5
	Woody vegetation (bamboo, willows, etc.)	Height of tallest woody vegetation exceeds 8′ or largest trunk diameter exceeds 3″	Remove woody vegetation only
	Flexible vegetation (cattails, bulrush, etc.)	No limit	No maintenance required
Maintenance Roads Inside Slope of Levees	Vegetation	Vegetation exceeds 3′	Eliminate vegetation

TABLE 7
Calabazas Creek—Guadalupe Slough to Miller Avenue Maintenance Standards for Sediment and Vegetation Removal (continued)

REACH 12: Tasman Drive to Highway 101

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Low Flow Channel	Sediment deposits	Uniform sediments in channel bottom exceed 3′ design top width decreased by 10′	Remove sediments restore low flow channel
	Woody vegetation (willows, bamboo, etc.)	Height of tallest vegetation growing within the low flow channel exceeds 6′	Cut or remove woody vegetation growing on the channel bottom. Vegetation overhanging from the habitat area should remain.
	Flexible vegetation	Height of tallest vegetation growing within the low flow channel exceeds 5′	Cut or remove vegetation growing on the channel bottom. Vegetation overhanging from the habitat area should remain.
Floodplain	Uniform sediments	Sediments 1 foot above inboard toe elevation of east levee	Remove sediments to inboard toe elevation of east levee.
	Local sediments bars, etc.	Local sediments 2′ above inboard toe elevation of east levee.	Remove sediments to inboard toe elevation of east levee.
	Woody vegetation	Height of tallest woody vegetation exceeds 5′	Remove or cut vegetation to vegetation to 1′ or less
	Flexible and low growing vegetation	Height of tallest flexible vegetation exceeds 3′	Remove or cut vegetation to 1′ or less
Habitat Area	Sediment and vegetation	No removal required within habitat area	No maintenance required
Maintenance Roads and Inside Slope of easterly Levee	Vegetation	Vegetation exceeds 3′	Remove vegetation

TABLE 7
Calabazas Creek—Guadalupe Slough to Miller Avenue
Maintenance Standards for Sediment and Vegetation Removal
(continued)

REACHES 13-26: Highway 101 to Lawrence Expressway

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Concrete Channel	Sediments	Sediment depth exceed 12″	Remove sediment
	Uniform surface abrasion	Surface roughness variation exceeds .04′	Resurface
	Local surface abrasion	Erosion of .20′	Resurface

SIGNIFICANT ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

This chapter summarizes the significant environmental impacts that would result from implementation of this project, and the mitigation measures that are proposed to reduce these impacts. Biological, aesthetic and cultural resource impacts were assessed by consultants. Their studies have been either merged into the report and/or are included in the appendices. Impacts associated with each reach are discussed in the chapter entitled "Description of the Proposed Project" and summarized in Table 8. Impacts to resources which are regulated by Federal and State Agencies, and the mitigation and monitoring plans are presented in Appendix S.

BIOLOGICAL AND AESTHETIC IMPACTS

The adverse biological and aesthetic impacts of the proposed project on Calabazas Creek vary considerably. The impacts depend upon the extent and location of existing plant communities and quality of wildlife habitat at the time of construction. Table 10 summarizes the impacts of the project to various habitat types.

A significant long-term biological impact of the proposed project will be the removal of approximately 6 acres of riparian habitat including approximately 162 trees (49 percent) located in Reaches 1-8. Appendix M lists the existing trees and indicates which ones are likely to be removed. However, trees in these reaches are currently being undermined by erosion. The bank stabilization provided by this project will protect approximately the same number of trees as will be removed during project construction. Another biological impact will be the loss of 1.7 acres of coastal brackish marsh and 0.06 acres of willow riparian habitats in Reaches 9-12 (downstream of Highway 101). Concrete floodwalls which will be constructed intermittently throughout Reaches 9-26 will have adverse aesthetic impacts.

Temporary adverse impacts on resident and transient wildlife will be caused by partial elimination of riparian plant communities in Reaches 1-12. Partial elimination of riparian habitat will result from project construction and proposed maintenance activities. Because riparian habitat is unique and highly productive, the wildlife dependent on it will be reduced in number and diversity but probably will not be eliminated. Most of the existing plant communities and animal populations have become reestablished since the completion of construction projects, in Reaches 9-12, between 10 and 25 years ago. In Reaches 1B, 2A, and 9-12, sediment benches supporting emergent wetland vegetation are expected to form. The postproject maintenance program in these areas will be less intense than the current maintenance program. Downstream of Tasman Drive, less frequent dredging would reduce the average available fish habitat but will increase upland habitat.

A long-term adverse aesthetic impact to the upper reaches of the creek (Reaches 1-8) will result from straightening the creek, lining the banks with gabions, and construction of access ramps. Raised levees and floodwalls will be visually obtrusive in the lower reaches (Reaches 9-12). The visual quality of most reaches of the creek will be reduced by initial removal of vegetation within the channel, especially that of mature trees, and by periodic removal of vegetation in order to maintain hydraulic capacity.

TABLE 10
Calabazas Creek

Guadalupe Slough to Miller Avenue
Existing and Postproject Conditions (Project Impacts)
(All Units of Acres)

Reaches 1-8 Totals (Overall)

CATEGORY	PREPROJECT	POSTPROJECT	CHANGE
Concrete Bank	0.304	0.628	0.324
Concrete Streambed	0.347	1.540	1.193
Rock/Rubble Bank	1.671	0.071	-1.600
Rock/Rubble Streambed	0.889	0.312	-0.577
Sand/Gravel Streambed	2.689	4.762	2.073
Bare Earth Bank	0.644	0.000	-0.644
Vegetated Earth Bank	4.639	3.183	-1.456
Gabion Bank Vegetated	0.000	2.839	2.839
Gabion Bank Herbaceous	0.000	1.324	1.324
In-stream Riparian	0.120	0.397	0.277
Top of Bank (Bare)	2.002	0.000	-2.002
Top of Bank (Surfaced)	0.325	0.246	-0.079
Top of Bank (Vegetated)	3.880	2.414	-1.466
SUBTOTAL	17.510	17.716	0.206

Reaches 9-12 Totals (Overall)

CATEGORY	PREPROJECT	POSTPROJECT	CHANGE
Coastal Brackish Marsh	15.843	15.843	0.000
Ruderal Upland	11.590	6.836	-4.754
Willow Riparian Forest	3.208	4.695	1.487
Open Water Mudflats	3.683	3.775	0.092
Maintenance Road	0.000	2.134	2.134
Concrete Lining	0.000	1.041	1.041
SUBTOTAL	34.324	34.324	0.000

Mitigation and Monitoring of Biological and Aesthetic Impacts

A 1.7 acre wetland area will be created downstream of Highway 237 (Reach 9) to compensate for losses to wetlands caused by project construction. An extensive revegetation program is planned from Lawrence Expressway to Miller Avenue (Reaches 1-8) to mitigate the loss of riparian forest habitat. Approximately 4,500 plantings are proposed over 8.3 acres. Plantings will consist of native ground cover, shrubs and trees, all of which were selected for wildlife habitat value and aesthetic appeal. Planting densities are expected to be approximately 450 plants per acre in gabions and 600 plants per acre on the earthen banks. Figure 10 shows typical sections of the planting scheme. The maintenance program has been developed to be compatible with the goals of the revegetation program. Reaches with habitat potential have been designed to ultimately accommodate a greater amount of vegetation within the right of way than now exists without compromising flood protection. A HEP analysis indicated that over the long-term the revegetation plan would more than compensate for project impacts. Details of the proposed revegetation and mitigation plan along with plates showing typical planting arrangements are included in Appendix S, "Mitigation and Monitoring Plans for Biological Impacts."

Creek habitat restoration is a combination of art and science. Although state-of-the-art techniques will be used to design, implement and monitor the revegetation plan, the success of the planting depends upon many variables, some of which cannot fully be controlled, such as predation and vandalism. Plantings will be irrigated until they are established and no longer require a supplemental source of water.

There is a Mitigation and Monitoring Plan for impacts to wetlands located in the most downstream reach of Calabazas Creek along the easterly bank of Reach 9 and along adjacent San Tomas Aquino Creek. (See Appendix S-I.) Replacement wetlands will be installed to cumulatively compensate for those wetlands which will be destroyed in Reaches 9, 10, and 11 as a consequence of the construction of depressed maintenance roads and concrete channel lining. This plan involves the creation of 1.7 acres of coastal brackish wetland by grading an existing levee to provide a 30-foot wide planting bench area at an elevation subject to tidal influence. This planting bench will then be revegetated with marsh plants which support wildlife and managed to insure mitigation goals. Figure 11 shows typical cross sections illustrating how the creek might appear 1 to 3 years after completion of the levee modification and revegetation.

The design for the flood control project downstream of Highway 101 (Reaches 9-12) allows an equilibrium or natural state to develop with sufficient capacity remaining to safely convey the 1 percent design flood. Over 3 acres between Highway 101 and Tasman Drive (Reach 12) are proposed to remain undisturbed by maintenance activities, allowing habitat to reestablish. Over 3 acres of habitat area with reduced maintenance requirements (compared to pre-project conditions) are proposed downstream of Tasman Drive (Reaches 9, 10, and 11). If dredging in Reach 11 becomes necessary, a secondary channel with a center island will be established to provide for additional fish habitat.

There is a Mitigation and Monitoring Plan for impacts to riparian habitat located in the upstream reaches of Calabazas Creek between Lawrence Expressway and Miller Avenue (Reaches 1-8). (See Appendix S-II.) Here replacement riparian habitat will be installed to compensate for habitat destroyed as the result of widening the channel and installing gabion slope protection. This plan involves revegetation of the channel cross section with trees and shrubs which have been selected for wildlife and aesthetic values. Construction of the widened gabion channel in Reaches 1-8 will permanently increase the gravel streambed area by 2 acres. The Memorandum of Understanding with the California Department of Fish and Game and Section 1601 Agreement are included in Appendix S.

In order to minimize impacts to wildlife, clearing of vegetation and initial construction activities will not begin until after July 1, when most species have completed the breeding season. In order to avoid impacts to burrowing owls, survey for burrowing owls will be conducted by District staff before issuing a notice to proceed for the construction contract in Reaches 9-12. If burrowing owls are found, a detailed plan for their relocation will be developed. The relocation site, the location methodology, and a monitoring program will be determined with assistance from the California Department of Fish and Game.

The aesthetic mitigation goals are to screen and soften the artificial appearance of the uniform gabion lining and to soften the appearance of concrete structures such as floodwalls and maintenance ramps. Trees and shrubs will be in various sized containers and the larger ones will be planted in the vicinity of bridges that cross gabion lined channels to provide more rapid visual screening. It will probably be at least 10 years after planting before the plant materials are large enough to produce a strong visual effect on the creek. Figure 10 shows typical cross sections illustrating how the creek might appear 10 to 15 years after completion of the channel modifications and revegetation.

The mattress gabions and the shelf area of the stepped gabions will be covered with soil to mitigate the structural appearance of the modified channel. The soil cover will also encourage natural revegetation with grasses and weedy species. The revegetation program will eventually result in mature vegetation which will soften and screen the artificial appearance of both the stepped gabions and the uniform side slopes of the modified channels.

Where floodwalls will be visible to traffic or extend above residential fencing, they will be architecturally treated to soften their visual impact. Maintenance ramps will also be architecturally treated. The architectural treatments could involve the use of color tints and textured concrete.

Final plans and specifications for the revegetation of Reaches 1-8 and Reach 9, and a final monitoring plan, will be submitted to the regulatory and natural resource agencies (CDFG, USFWS, COE) for approval prior to implementation.

Alternative revegetation strategies were investigated which involved transplanting existing larger trees to other on-site locations. Transplant criteria were established including site topographic conditions, pretransport pruning and fertilization schedules, costs, and success rates. Evaluation of these criteria indicated that revegetation with container nursery stock had the highest potential to effectively mitigate losses.

Installation of revegetation shall be undertaken in fall or early winter to coincide with the planting season, and shall be implemented with 12 months of completion of the flood control improvements. If scheduling is not feasible in the first planting season after construction is complete, then the period may be extended up to 18 months. Reclaimed water will be used for irrigation.

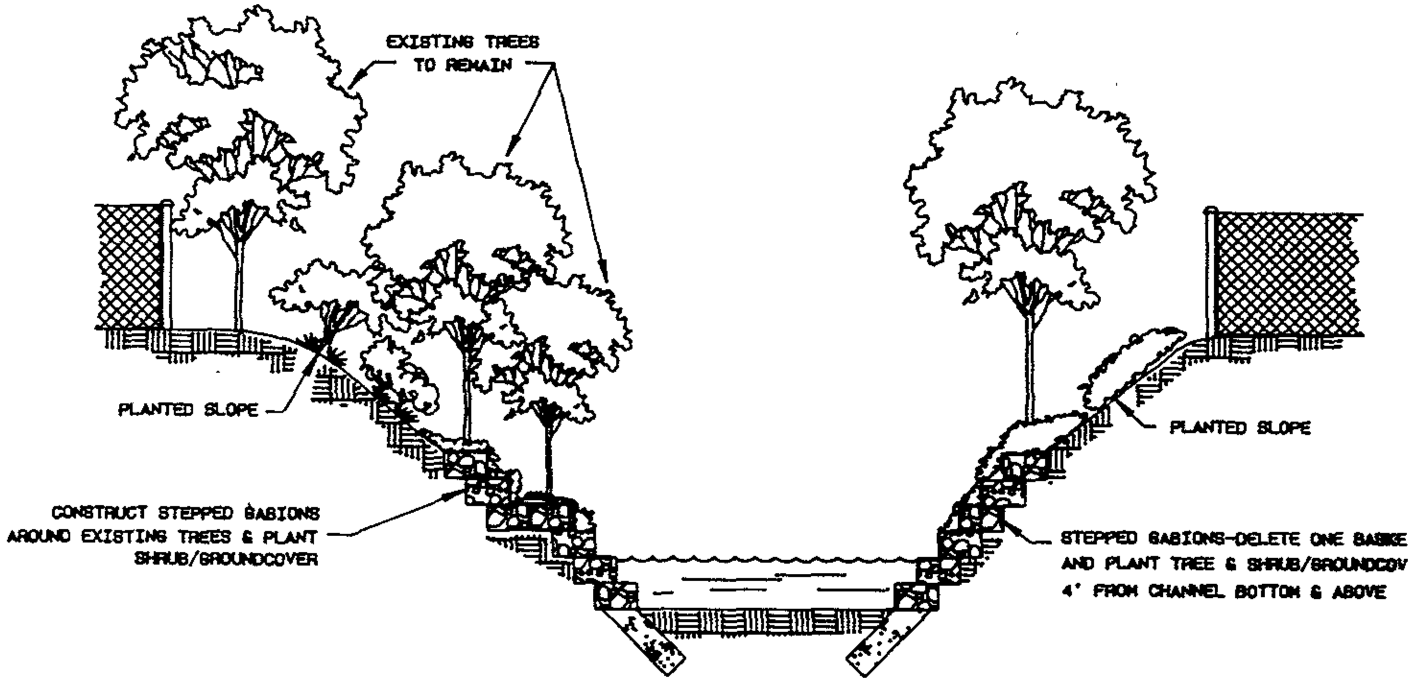
ARCHEOLOGICAL IMPACTS

Archival research revealed two possible archaeologically significant sites adjacent to the project area. Near Central Expressway, archeological material was identified in 1974. Another possible site is adjacent to Mission College. The archaeology reports are contained in Appendices Q and R.

Mitigation and Monitoring of Archeological Impacts

Earthmoving activities in these two areas will be monitored by a qualified archeologist. In the event that cultural materials are exposed during construction, the archeologist will examine them and make appropriate recommendations.

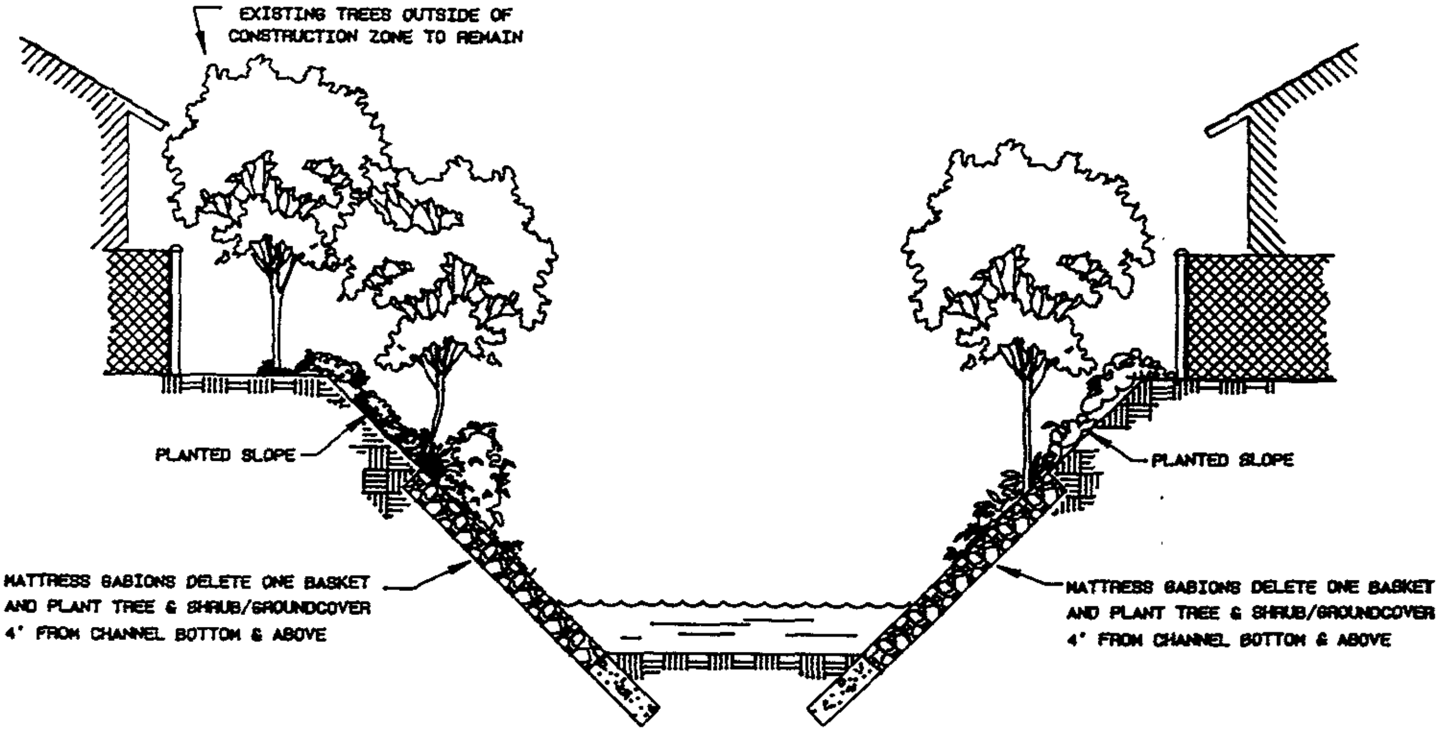
FIGURE 10


EXISTING TREES
TO REMAIN
PLANTED SLOPE
CONSTRUCT STEPPED GABIONS
AROUND EXISTING TREES & PLANT
SHRUB/GROUNDCOVER
PLANTED SLOPE
STEPPED GABIONS-DELETE ONE BASKE
AND PLANT TREE & SHRUB/GROUNDCOV
4' FROM CHANNEL BOTTOM & ABOVE

TYPICAL SECTION-REACHES 3B, 4 & 5

10-15 YEARS MATURITY

NTS

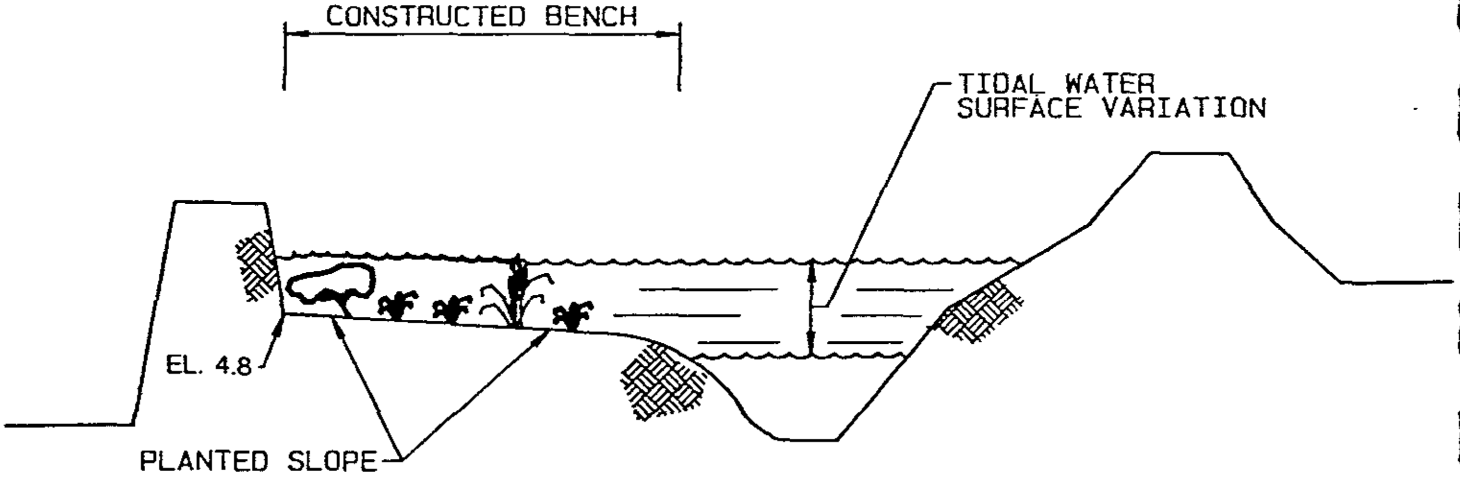

EXISTING TREES OUTSIDE OF
CONSTRUCTION ZONE TO REMAIN
PLANTED SLOPE
MATTRESS GABIONS DELETE ONE BASKET
AND PLANT TREE & SHRUB/GROUNDCOVER
4' FROM CHANNEL BOTTOM & ABOVE
PLANTED SLOPE
MATTRESS GABIONS DELETE ONE BASKET
AND PLANT TREE & SHRUB/GROUNDCOVER
4' FROM CHANNEL BOTTOM & ABOVE

TYPICAL SECTION-REACHES 1C & 2

10-15 YEARS MATURITY

NTS

FIGURE 11



TYPICAL SECTION REACH 9
1-3 YEARS MATURITY
NTS

IMPACTS TO LOCAL DRAINAGE

With the proposed project, water levels during floods would be slightly higher than without the project between Guadalupe Slough and about 1,500 feet upstream of Highway 101. For the 1 percent flood flow rate, the increase in water surface is approximately 1 foot with a 3 to 5 hour duration. The storm drain systems are designed to deliver a certain flow rate for a certain water level in the channel. If either the flow rate to be delivered or the water surface in the channel is increased above the design level, water will temporarily pond in the streets. By design, ponding is expected at a certain frequency. Increased water elevation in the creek caused by the proposed project would slightly increase the frequency of ponding in the streets in areas without storm water pumping stations.

Mitigation of Local Drainage Impacts

Flap gates would be provided at storm drain outlets to prevent reverse flow. Maintenance of the flap gates will be the responsibility of the District, or if by agreement, the owners of storm drain systems.

Monitoring of Mitigation of Local Drainage Impacts

District inspectors would ensure that flap gates of an approved design are installed to specifications.

CONSTRUCTION-RELATED IMPACTS

During construction, noise generated by heavy equipment will reach high levels for short periods. Noise will affect residents and wildlife along the creek in varying degrees depending upon the type of work performed and/or required construction equipment used.

Present noise levels in most residential areas are 10 to 15 dBA below the HUD acceptable standard. Construction noise, therefore, will have a more severe effect on the residential environment than in commercial areas which have higher ambient noise levels. By calculating the noise level generated by typical types of construction equipment, it is estimated that the noise impact during construction will disturb persons within 200 feet of the site, and to a much lesser degree at 400 feet, with no impact at 800 feet. Thus, noise resulting from construction activities can potentially affect over 800 single-family houses, a far smaller number of apartment units, as well as users of several parks and schools.

The noise impact, as well as other construction-related impacts, will be tempered somewhat because the channel work will be staged over three years; there will not be a single concerted time span of work. For example, channel excavation work in any reach will last only a few months.

Temporary traffic diversion and congestion caused by traffic control and/or detours may occur within the construction area. Traffic circulation will be temporarily impaired particularly at four street crossings where the culverts will be enlarged and at Kifer Road and Miller Avenue because of new bridge construction. Traffic may also be temporarily impaired by the construction of floodwalls at six crossings and at the road which parallels the creek on Mission College. During construction, potential hazardous conditions will exist for vehicles and pedestrians.

Construction grading activities and related equipment has the potential to increase ambient levels of particulates, carbon monoxide, hydrocarbons, sulfur dioxide and oxides of nitrogen. Any degradation of air quality that may occur during construction will be localized and highly dependent upon prevailing wind conditions, other ambient climatological conditions and effectiveness of dust suppressant methods used by the contractor. During severe temperature inversion conditions, the local impact may be intensified.

The channel construction will involve grading very near property lines with heavy equipment. Many existing fences along property lines are in poor condition and are likely to be damaged during construction. Property line fences damaged by construction or deemed unsafe will be repaired by the District.

Vibrations and ground settlement resulting from construction activities could potentially damage houses, and other structures adjacent to the creek channel.

Construction of the new creek channel could require relocation of utilities with the possible short-term disruption of service.

Construction activities will include transport and storing of materials and equipment outside the specified construction footprint. These activities could result in the additional loss of vegetation beyond what is necessary to construct the project.

The nature and extent of temporary degradation of water quality in the channel due to erosion and sediment transport is dependent upon construction timing. If construction work takes place during the dry season as planned, turbidity of the downstream flows would not be significantly increased by the project. If rain should occur soon after grading is completed, erosion from disturbed soil surfaces would be substantially increased. The amount of sediment generated from the project site will be influenced over the long-term by the success of the revegetation program in establishing ground cover and other types of vegetation that reduce erosion. The rate of natural reestablishment of vegetation will also affect erosion.

Over the long-term, water quality will be improved due to the installation of gabion slope protection in the channel.

There is a possibility of encountering contaminated groundwater or soils during construction. Known contamination sites are listed in Appendix U.

Mitigation of Construction-Related Impacts

Contractors will be required by the District's construction specifications to follow applicable federal, state and local guidelines, laws and regulations to minimize soil erosion and water, air and noise pollution during construction. To minimize erosion from water flowing in the channel and to avoid bank failures from high flows, construction will be scheduled to complete creek section modifications before heavy winter rains begin. Conditions imposed on contractors implementing the project would mitigate these construction related impacts.

Damage to adjacent properties resulting from construction activities will be minimized by field marking project right of way lines/private property lines to insure private property will not be encroached upon or disturbed. Any coincidental damage occurring will be repaired in an equitable and timely manner.

Disruptions to utility service will be minimized by early coordination with utility companies accommodating turn key type utility relocations.

Unnecessary loss of vegetation will be minimized by specifying contractor penalties for loss of vegetation not identified on the plans. Accidental construction impacts to riparian and wetland vegetation immediately adjacent to areas that will be graded or disturbed will be prevented by fencing sensitive areas with plastic mesh construction fencing prior to construction. Prior to construction, a qualified botanist will visit areas of concern to determine whether placement of fencing is necessary.

The District will develop traffic control plans together with each appropriate city during project design.

A management plan has been developed to minimize the effect of construction on any existing contamination and to assure compliance with all State and Federal laws (see Appendix U).

Monitoring of Mitigation for Construction-Related Impacts

District inspectors will oversee construction through on-site inspections to insure conformance by the contractor to the specifications.

GROWTH INDUCING IMPACTS

There are potentially developable lands within the flood hazard area affected by the project. Providing flood protection will have no influence on growth in the floodplain. These lands are zoned for development. The flood hazard does not preclude development of these lands.

TABLE 8
Calabazas Creek Flood Control Project
Summary of Impacts and Mitigation Measures

REACH	PROPOSED MEASURES	PROJECT IMPACTS	CONSTRUCTION IMPACTS	MITIGATION
1 Lawrence Expy. to Lochinvar Avenue	Regrade existing channel. Install gabion slope protection. Construction 500′ bypass channel. Install two additional 12 x 10 box culverts at Lochinvar Avenue.	Similar to routine channel maintenance, in-stream habitat disturbed by construction 31 (38%) trees removed 53 (62%) trees protected. 0.8 ac. of habitat removed. Visual character changed.	Construction activities generate noise and dust. Traffic impacted at Lochinvar Avenue.	- 625 native trees and shrubs planted on channel banks. 1.6 ac of habitat restored. Gabions soil-covered to soften visual impact and revegetate. No construction started during breeding season (Mar 1 to Jul 1). Traffic plan to be developed. Specifications for noise and dust.
2 Lochinvar Avenue to Homestead Rd.	Regrade existing channel. Install gabion slope protection. Install two additional 11 x 10 box culverts at Homestead Road.	Similar to routine channel maintenance, in-stream habitat disturbed by construction 22 (69%) trees removed 10 (31%) trees protected. 0.42 ac. of habitat removed. Visual character changed.	Construction activities generate noise and dust. Traffic impacted at Homestead Road.	- 375 native trees and shrubs planted on channel banks. Gabions soil-covered to soften visual impact and revegetate. 0.5 ac. of habitat restored. No construction started during breeding season (Mar 1 to Jul 1). Traffic plan to be developed. Specifications for noise and dust.
3 Homestead Road to Pruneridge Avenue	Regrade existing channel. Install gabion slope protection. Install 2 additional 11 x 10 box culverts at Pruneridge Avenue.	Similar to routine channel maintenance, in-stream habitat disturbed by construction 59 (66%) trees removed 31 (34%) trees protected. 2.1 ac. of habitat removed. Visual character changed.	Construction activities generate noise and dust. Traffic impacted at Pruneridge Avenue.	- Establishment of in-stream vegetation in Reach 3A. 1100 native trees and shrubs planted on channel banks in Reach 3B. Gabions soil-covered to soften visual impact and revegetate. 2.3 ac. of habitat restored. No construction started during breeding season (Mar 1 to Jul 1). Traffic plan to be developed. Specifications for noise and dust.
4 Pruneridge Avenue to Tantau Avenue	Regrade existing channel. Install gabion slope protection. Install two additional 11 x 10 box culverts at Tantau Avenue.	Similar to routine channel maintenance, in-stream habitat disturbed by construction 23 (27%) trees removed 62 (73%) trees protected. 1.4 ac. of habitat removed. Visual character changed.	Construction activities generate noise and dust. Traffic impacted at Tantau Avenue.	- 500 native trees and shrubs planted on channel banks. Gabions soil-covered to soften visual impact and revegetate. 1.5 ac. of habitat restored. No construction started during breeding season (Mar 1 to Jul 1). Traffic plan to be developed. Specifications for noise and dust.

TABLE 8
Calabazas Creek Flood Control Project
Summary of Impacts and Mitigation Measures
(continued)

REACH	PROPOSED MEASURES	PROJECT IMPACTS	CONSTRUCTION IMPACTS	MITIGATION
5 Tantau Avenue to Hwy 280	Regrade existing channel. Install gabion slope protection.	Similar to routine channel maintenance, in-stream habitat disturbed by construction 6 (100%) trees removed. 0.6 ac. of habitat removed. Visual character changed.	Construction activities generate noise and dust.	- 500 native trees and shrubs planted on channel banks. Gabions soil-covered to soften visual impact and revegetate. 0.8 ac. of habitat restored. No construction started during breeding season (Mar 1 to Jul 1). Specifications for noise and dust.
8 Stevens Creek Blvd. to Miller Avenue	Regrade existing channel. Install gabion slope protection. Remove existing culvert and install clear span bridge at Miller Avenue.	Similar to routine channel maintenance, in-stream habitat disturbed by construction 20 (63%) trees removed 12 (37%) trees protected. 0.6 ac. of habitat removed. Visual character changed.	Construction activities generate noise and dust. Traffic impacted at Miller Avenue.	- 1100 native trees and shrubs planted on channel banks. Gabions soil-covered to soften visual impact and revegetate. 1.6 ac. habitat restored. No construction started during breeding season (Mar 1 to Jul 1). Traffic plan to be developed. Specifications for noise and dust.
9 Guadalupe Slough to Hwy. 237	Raised levees, floodproofed bridge at Moffet Park Drive, raised bridges at Hwy. 237 (by Caltrans).	Similar to routine channel maintenance, in-stream habitat disturbed by construction. Project will provide in-stream habitat area with low maintenance requirements. 0.06 ac. of wetlands removed.	Construction activities generate noise and dust.	No construction started during breeding season (Mar 1—Jul 1). Survey for Burrowing Owls and relocate if found. Specifications for noise and dust. Eastern levee and San Tomas Aquino Creek levee redesigned to create 1.7 ac. of wetlands to offset loss in Reaches 9, 10, 11.
10 Hwy. 237 to Old Mountain View Alviso Road	Raised levees, depressed maintenance roads, floodproofed bridge at Old Mountain View Alviso Road.	Similar to routine channel maintenance, in-stream habitat disturbed by construction. Project will provide in-stream habitat area with low maintenance requirements. 0.17 ac. of wetlands removed.	Construction activities generate noise and dust. Traffic impacted at Old Mountain View Alviso Road.	No construction started during breeding season (Mar 1—Jul 1). Survey for Burrowing Owls and relocate if found. Specifications for noise and dust. Traffic plan to be developed. Loss of wetlands to be mitigated in Reach 9.

TABLE 8
Calabazas Creek Flood Control Project
Summary of Impacts and Mitigation Measures
(continued)

REACH	PROPOSED MEASURES	PROJECT IMPACTS	CONSTRUCTION IMPACTS	MITIGATION
11 *Old Mountain* View Alviso Road to Tasman Drive	Raised levees, depressed maintenance roads, floodproofed bridge at Tasman Drive.	Similar to routine channel maintenance, in-stream habitat disturbed by construction. Project will provide in-stream habitat area with low maintenance requirements. Average area available for fishery may decrease. Loss of 1.47 acres of wetlands.	Construction activities generate noise and dust. Traffic impacted at Tasman Drive.	No construction started during breeding season (Mar 1—Jul 1). Survey for Burrowing Owls and relocate if found. If sediment removal becomes necessary, construct secondary channel. Specifications for noise and dust. Traffic *plan to be developed. Loss of wetlands to* be mitigated in Reach 9.
12 Tasman Drive to Hwy 101	Floodwall on west bank. On east bank, raised levee 3,000 feet upstream of Tasman Drive, then floodwall to Hwy. 101.	Similar to routine channel maintenance, in-stream habitat disturbed by construction. Project will provide undisturbed in-stream habitat. Floodwalls will be visually obtrusive.	Construction activities generate noise and dust. Traffic impacted at road to Mission College.	No construction started during breeding season (Mar 1—Jul 1). Survey for Burrowing Owls and relocate if found. Architecturally treat floodwall. Specifications for noise and dust.
13—26 Hwy 101 to Lawrence Expy.	*Floodwalls upstream of Hwy 101, Central* Expy and Pomeroy Avenue. Clear span bridge at Kifer Road. Relocate El Camino Storm Drain downstream of SPRR.	*Floodwalls will be visually obtrusive.*	Construction activities generate noise and dust. Traffic impacted at Lakeside Drive, Central Expy., Kifer Road and Pomeroy Avenue.	Architecturally treat floodwall. Specifications for noise and dust.

PROJECT COST, FINANCING, AND STAGING

The estimated total first cost of the proposed flood control project is $16.5 million and includes all cost for engineering, construction, inspection and administration.

The proposed measures will be funded through two sources of existing revenue; (1) the North Central Flood Control Zone's allocation of the 1 percent property tax and (2) North Central Flood Control Zone benefit assessments. (The assessment per single family residence is $14.06 per year in FY 1991-92.) Debt financing will be used to supplement these two revenue sources and thereby permit an accelerated completion schedule for the project. This will permit the project to be constructed over a 3- to 4-year period.

With the June 1990 passage of the revised Benefit Assessment program in the zone, long-term debt financing such as certificates of participation was authorized. This makes it possible to accelerate construction of the Calabazas Creek project over pay as you go financing alternatives. The project from the bay to Miller Avenue is now staged over a 3 to 4-year period.

Highest priority has been given to Reaches 1 and 2 between Lawrence Expressway and Homestead Road where existing problems could be solved without downstream impacts. Work will then progress from Guadalupe Slough upstream until the last element is completed.

The estimated construction schedule is provided in Table 9. As shown in the table, project construction could begin in Fiscal Year 1992-93 with the last reach underway by Fiscal Year 1994-95. The schedule may vary depending on available funding and staging of construction elements.

TABLE 9
Calabazas Creek Flood Control Project
Construction Staging

Reach	Limits	Proposed Measures	Estimated 1992 Total First Cost	Scheduled Commencement of Construction (Fiscal Year)
1	U/s Lawrence Expwy. to u/s Lochinvar Avenue	R/W Acquisition	$750,000	1992-93[2]
		Gabion Channel, Culvert Addition, Revegetation[1]	$1,744,000	1992-93
2	U/s Lochinvar Ave. to u/s Homestead Road	R/W Acquisition	$ 13,000	1992-93
		Gabion Channel & Culvert Addition Revegetation[1]	$1,106,000	1992-93
9	U/s Guadalupe Slough to u/s Hwy. 237	Raised Levees, Maintenance roads Floodproof Moffett Park Dr. Bridge Revegetation[1]	$824,000	1993-94
10	U/s Hwy. 237 to u/s Old Mountain View-Alviso Rd.	Raised Levees Depressed Maintenance Road & Floodproof Mountain View-Alviso Road Bridge[1]	$269,000	Following completion of construction of Hwy. 237 Bridge by Caltrans
11	U/s Old Mountain View Alviso Rd. to u/s Tasman Dr.	Raised Levees Maintenance Roads & Floodproof Tasman Dr. Bridge[1]	$860,000	1992-93[2]
12	U/s Tasman Dr. to u/s Highway 101	Raised Levees/ Floodwall, Maintenance Road	$1,849,000	1992-93[2]

---

[1] Reach construction involves biological impacts which require mitigation including revegetation. See reach descriptions for details. Installation of revegetation shall be undertaken in fall or early winter to coincide with the planting season, and shall be implemented within 12 months of completion of the flood control improvements. If scheduling is not feasible in the first planting season after construction is complete, then the period may be extended up to 18 months.

[2] Construction of this Reach is scheduled over two construction seasons.

TABLE 9
Calabasas Creek Flood Control Project
Construction Staging
(continued)

Reach	Limits	Proposed Measures	Estimated 1992 Total First Cost	Scheduled Commencement of Construction (Fiscal Year)
13	U/s Highway 101 to u/s Arques Avenue	New Levees/Floodwall Maintenance Roads	$401,000	1992-93[2]
14	U/s Arques Avenue to u/s Central Expressway	No Project	0	
15	U/s Central Expwy. to u/s Kifer Ave.	Floodwalls New Bridge at Kifer Road	$1,415,000	1993-94
16	U/s Kifer Ave. to u/s SPRR	Relocate El Camino Storm Drain Confluence	$691,000	1993-94
17-24	U/s SPRR to u/s Pomeroy Avenue	No Project	0	
25	U/s Pomeroy Ave. to u/s Benton Street	Floodwalls	$153,000	1993-94
26	U/s Benton St. to u/s Lawrence Expressway	No Project	0	
3	U/s Homestead Rd. to u/s Pruneridge Ave.	R/W Acquisition,	$ 400,000	1993-94
		Gabion Channel, Culvert Addition, Revegetation[1]	$1,723,000	1993-94
4	U/s Pruneridge Ave. to u/s Tantau Ave.	Gabion Channel, Culvert Addition, Revegetation[1]	$1,679,000	1993-94

---

[1] Reach construction involves biological impacts which require mitigation including revegetation. See reach descriptions for details. Installation of revegetation shall be undertaken in fall or early winter to coincide with the planting season, and shall be implemented within 12 months of completion of the flood control improvements. If scheduling is not feasible in the first planting season after construction is complete, then the period may be extended up to 18 months.

[2] Construction of this Reach is scheduled over two construction seasons.

TABLE 9
Calabasas Creek Flood Control Project
Construction Staging
(continued)

Reach	Limits	Proposed Measures	Estimated 1992 Total First Cost	Scheduled Commencement of Construction (Fiscal Year)
5	U/s Tantau Ave. to u/s Hwy. 280	Gabion Channel, Culvert Modification, Revegetation[1]	$930,000	1993-94
6	U/s Hwy. 280 to u/s Vallco Pkwy.	No project	0	
7	U/s Vallco Pkwy. to u/s Stevens Creek Blvd.	No project	0	
8	U/s Stevens Creek Blvd. to u/s Miller Ave.	Gabion Channel, New Bridge at Miller Avenue, Revegetation[1]	$1,756,000	1994-95
		TOTAL PROJECT COST	$16,563,000	

---

[1] Reach construction involves biological impacts which require mitigation including revegetation. See reach descriptions for details. Installation of revegetation shall be undertaken in fall or early winter to coincide with the planting season, and shall be implemented within 12 months of completion of the flood control improvements. If scheduling is not feasible in the first planting season after construction is complete, then the period may be extended up to 18 months.

[2] Construction of this Reach is scheduled over two construction seasons.

CONCLUSIONS AND RECOMMENDATIONS

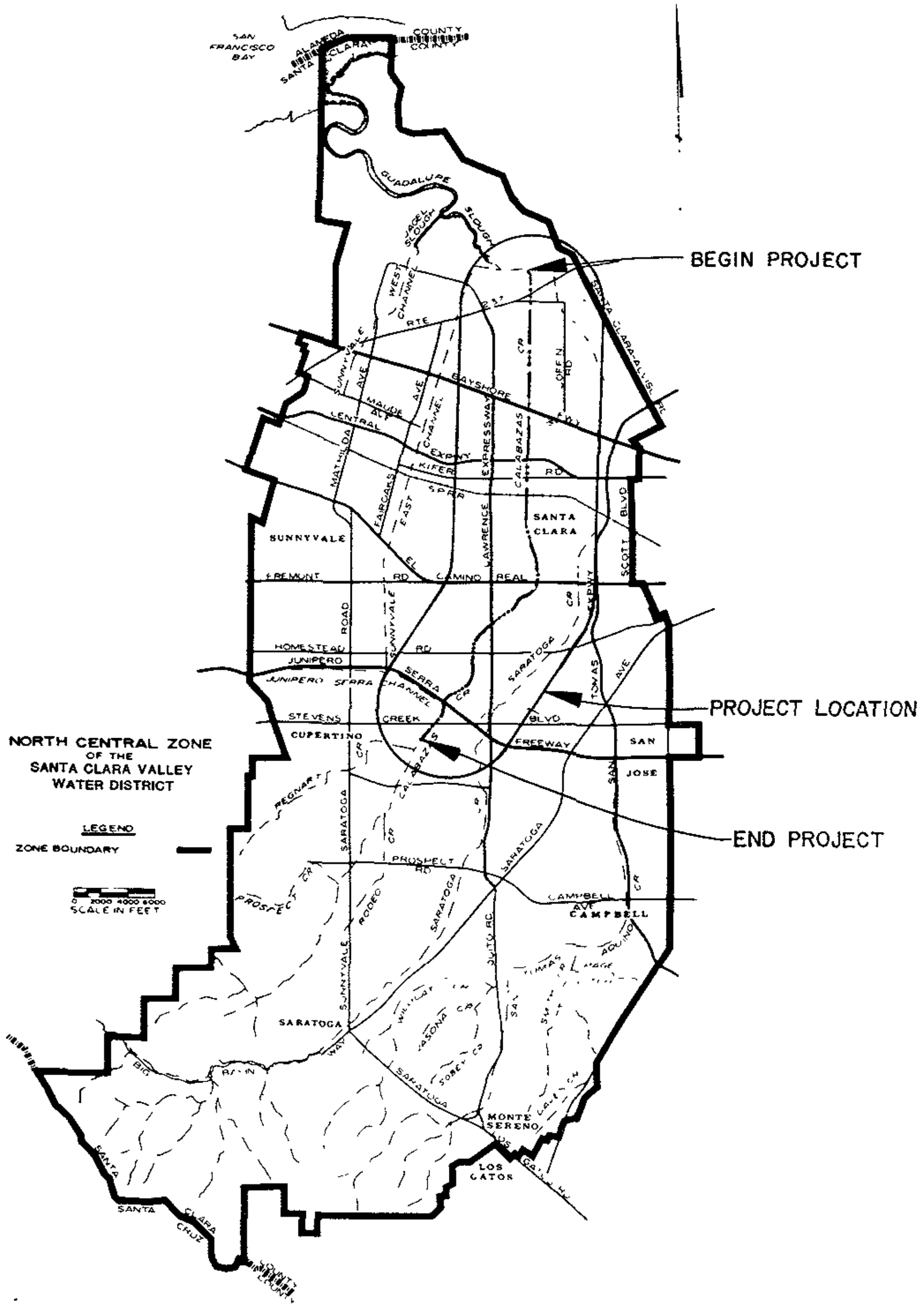
The existing flood carrying capacity of Calabazas Creek between Guadalupe Slough and Miller Avenue is less than the 1 percent design flow. Six inadequate culverts within this reach have flooded in recent years. A 1 percent flood in this reach would affect over 2,000 existing structures resulting in estimated flood damages of $35.2 million.

The flood damage potential of Calabazas Creek is accompanied by ongoing maintenance problems. Severe erosion, sediment deposition, debris accumulation, vegetation growth and limited access contribute to frequent and costly maintenance operations.

The proposed flood control project would provide protection from the 1 percent flood and a stable, easily maintained channel. The project includes measures to fully mitigate the environmental impacts. The project will cost $16.5 million and would be funded from existing revenue sources.

It is recommended that the measures proposed in this report be approved and construction plans be prepared for implementation of the project.

PLATES



MAP AND GENERAL PLAN

FOR

CALABAZAS CREEK

FROM

GUADALUPE SLOUGH TO MILLER AVENUE

Santa Clara Valley Water District

NORTH CENTRAL FLOOD CONTROL ZONE

PROJECT NO. 2010

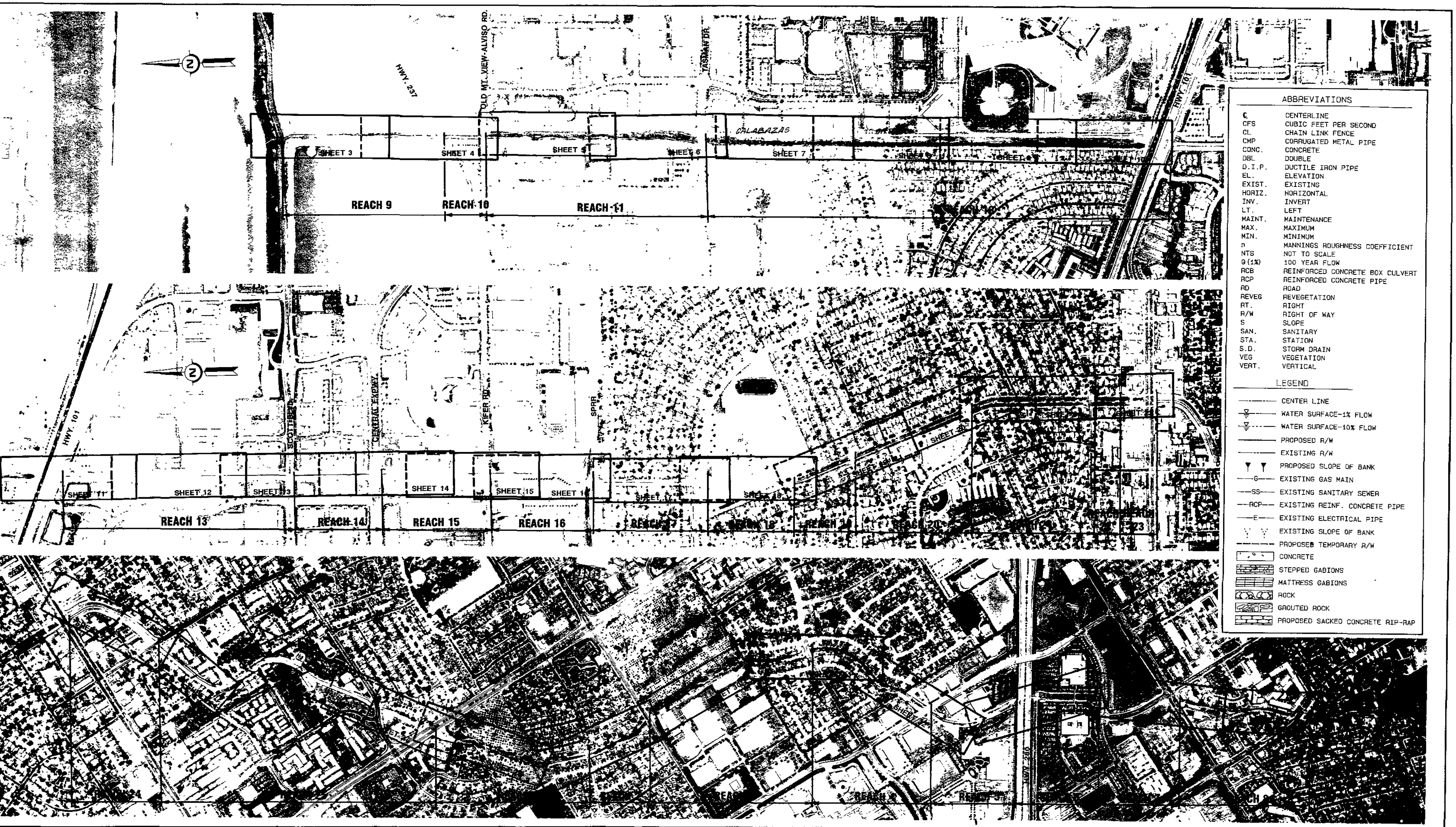
INDEX

SHEET NO.	DESCRIPTION
1	LOCATION MAP & TITLE SHEET
2	INDEX MAP
3-35	PLAN & PROFILE

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

PROJECT APPROVAL
R. Kay Whitlock
FLOOD CONTROL MANAGER

DATE:



ABBREVIATIONS

℄	CENTERLINE
CFS	CUBIC FEET PER SECOND
CL	CHAIN LINK FENCE
CMP	CORRUGATED METAL PIPE
CONC.	CONCRETE
DBL	DOUBLE
D.I.P.	DUCTILE IRON PIPE
EL.	ELEVATION
EXIST.	EXISTING
HORIZ.	HORIZONTAL
INV.	INVERT
LT.	LEFT
MAINT.	MAINTENANCE
MAX.	MAXIMUM
MIN.	MINIMUM
n	MANNINGS ROUGHNESS COEFFICIENT
NTS	NOT TO SCALE
Q (1%)	100 YEAR FLOW
RCB	REINFORCED CONCRETE BOX CULVERT
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
REVEG	REVEGETATION
RT.	RIGHT
R/W	RIGHT OF WAY
S	SLOPE
SAN.	SANITARY
STA.	STATION
S.D.	STORM DRAIN
VEG	VEGETATION
VERT.	VERTICAL

LEGEND

— - — - —	CENTER LINE
▽ ——	WATER SURFACE-1% FLOW
▽ - - —	WATER SURFACE-10% FLOW
———	PROPOSED R/W
— — —	EXISTING R/W
▼ ▼	PROPOSED SLOPE OF BANK
—G—	EXISTING GAS MAIN
—SS—	EXISTING SANITARY SEWER
—RCP—	EXISTING REINF. CONCRETE PIPE
—E—	EXISTING ELECTRICAL PIPE
Y Y	EXISTING SLOPE OF BANK
— — — —	PROPOSED TEMPORARY R/W
▭	CONCRETE
▤	STEPPED GABIONS
▤	MATTRESS GABIONS
▨	ROCK
▨	GROUTED ROCK
▤	PROPOSED SACKED CONCRETE RIP-RAP

DESCRIPTION	DATE	APPR

REFERENCE INFORMATION AND NOTES

SHEETS 13, 17-23, 25-27 ARE NOT INCLUDED IN THESE PLANS

PHOTOGRAPHY BY

DATE

RECTIFICATI

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

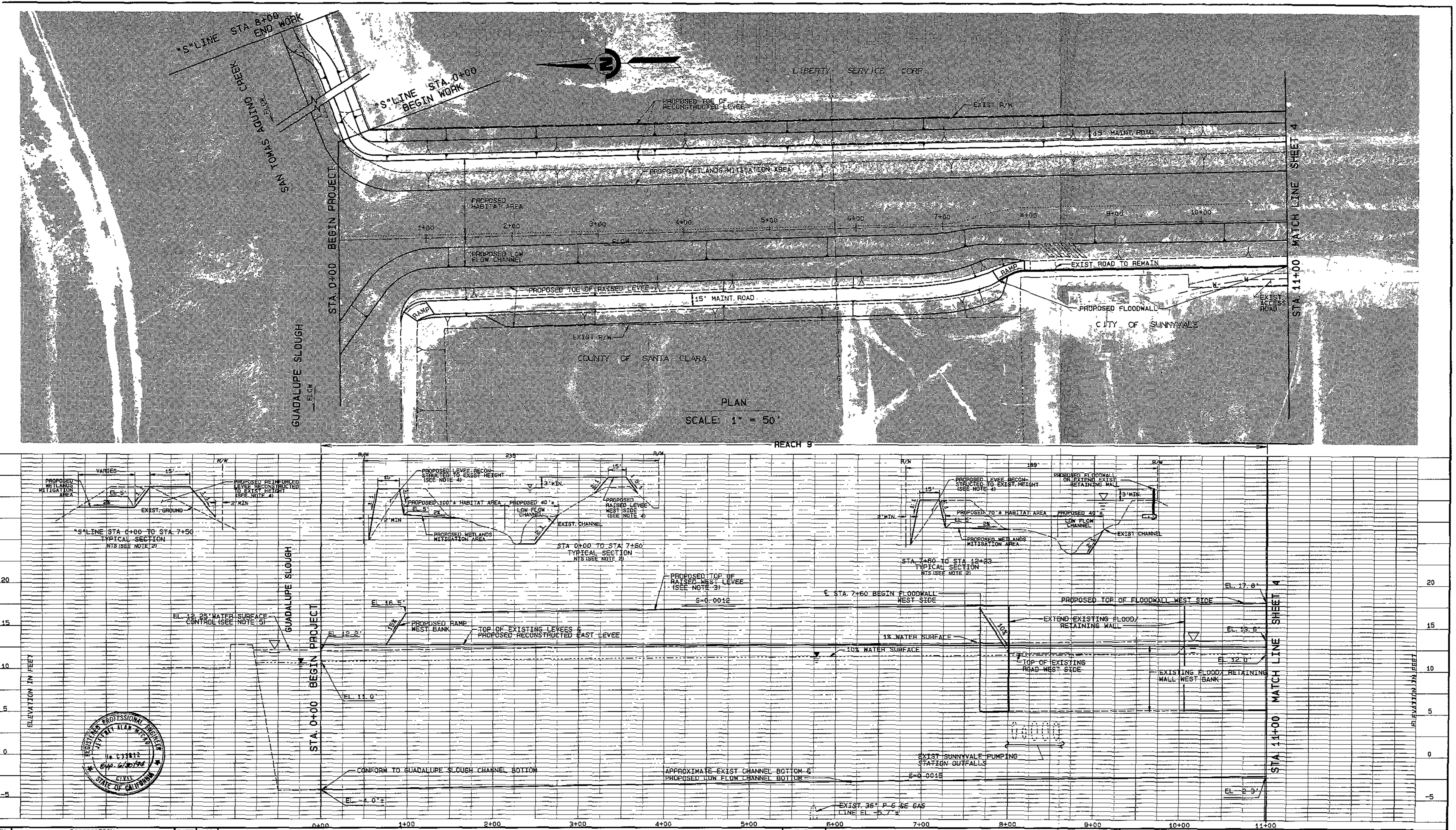
DATE
DESIGN
DRAWN
CHECKED

Santa Clara Valley Water District

CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVE.
INDEX TO SHEETS

SCALE
NTS

SHEET
2


"S"LINE STA 8+00 END WORK
SAN TOMAS AQUINO CREEK
FLOW
"S"LINE STA 0+00 BEGIN WORK
LIBERTY SERVICE CORP
PROPOSED TOE OF RECONSTRUCTED LEVEE
EXIST R/W
15' MAINT. ROAD
PROPOSED WETLANDS MITIGATION AREA
PROPOSED HABITAT AREA
PROPOSED LOW FLOW CHANNEL
FLOW
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
PROPOSED TOE OF RAISED LEVEE
15' MAINT. ROAD
RAMP
RAMP
EXIST. ROAD TO REMAIN
PROPOSED FLOODWALL
EXIST. ACCESS ROAD
EXIST R/W
COUNTY OF SANTA CLARA
CITY OF SUNNYVALE
STA. 0+00 BEGIN PROJECT
GUADALUPE SLOUGH
STA. 11+00 MATCH LINE SHEET 4
PLAN
SCALE: 1" = 50'
REACH 9
R/W
VARIES
15'
PROPOSED WETLANDS MITIGATION AREA
EL. 5'
2%
EXIST. GROUND
PROPOSED REINFORCED LEVEE RECONSTRUCTED TO EXIST HEIGHT (SEE NOTE 4)
2' MIN
"S"LINE STA 0+00 TO STA. 7+50 TYPICAL SECTION NTS (SEE NOTE 2)
R/W
235'
R/W
15'
PROPOSED LEVEE RECONSTRUCTED TO EXIST HEIGHT (SEE NOTE 4)
3' MIN.
15'
PROPOSED 100' ± HABITAT AREA
PROPOSED 40' ± LOW FLOW CHANNEL
EL. 5'
2%
2' MIN
PROPOSED RAISED LEVEE WEST SIDE (SEE NOTE 4)
EXIST. CHANNEL
PROPOSED WETLANDS MITIGATION AREA
STA 0+00 TO STA 7+60 TYPICAL SECTION NTS (SEE NOTE 2)
R/W
189'
R/W
15'
PROPOSED LEVEE RECONSTRUCTED TO EXIST. HEIGHT (SEE NOTE 4)
PROPOSED FLOODWALL OR EXTEND EXIST RETAINING WALL
3' MIN.
2' MIN
PROPOSED 70' ± HABITAT AREA
PROPOSED 40' ± LOW FLOW CHANNEL
EL. 5'
2%
EXIST CHANNEL
PROPOSED WETLANDS MITIGATION AREA
STA. 7+60 TO STA 12+23 TYPICAL SECTION NTS (SEE NOTE 2)
PROPOSED TOP OF RAISED WEST LEVEE (SEE NOTE 3)
S=0.0012
EL. 16.5'
EL. 12.25' WATER SURFACE CONTROL (SEE NOTE 5)
15%
PROPOSED RAMP WEST BANK
EL. 12.2'
TOP OF EXISTING LEVEES & PROPOSED RECONSTRUCTED EAST LEVEE
EL. 11.0'
℄ STA. 7+60 BEGIN FLOODWALL WEST SIDE
PROPOSED TOP OF FLOODWALL WEST SIDE
EL. 17.8'
EXTEND EXISTING FLOOD/ RETAINING WALL
10%
1% WATER SURFACE
10% WATER SURFACE
EL. 13.6'
TOP OF EXISTING ROAD WEST SIDE
EL. 12.0'
EXISTING FLOOD/ RETAINING WALL WEST BANK
EXIST SUNNYVALE PUMPING STATION OUTFALLS
CONFORM TO GUADALUPE SLOUGH CHANNEL BOTTOM
APPROXIMATE EXIST CHANNEL BOTTOM & PROPOSED LOW FLOW CHANNEL BOTTOM
S=0.0015
EL. -4.0' ±
EXIST. 36" P-G &E GAS LINE EL. -5.7' ±
EL. -2.3'
ELEVATION IN FEET
20
15
10
5
0
-5
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00

JEFFREY ALAN MICKO
No. C33812
Exp. 6/30/94

REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

1. 1% FLOWRATE 4300 CFS, 10% FLOWRATE 2800 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM
3. PLACE 6" OF ARMORING AGGREGATE LEVEE MAINTENANCE ROADS.
4. EMBANKMENTS WITH SLOPES GREATER THAN 2:1 SHALL BE REINFORCED.
5 WATER SURFACE CONTROL ESTABLISHED FROM MEAN HIGHER HIGH WATER IN SAN FRANCISCO BAY COINCIDENT WITH THE 1% FLOW RATE IN GUADALUPE SLOUGH SEE REPORT APPENDIX I.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE
DATE:
RECTIFICATION BY:

DATE 10/9/90
DESIGN JM/KR
DRAWN AH/CM/SL
CHECKED JM

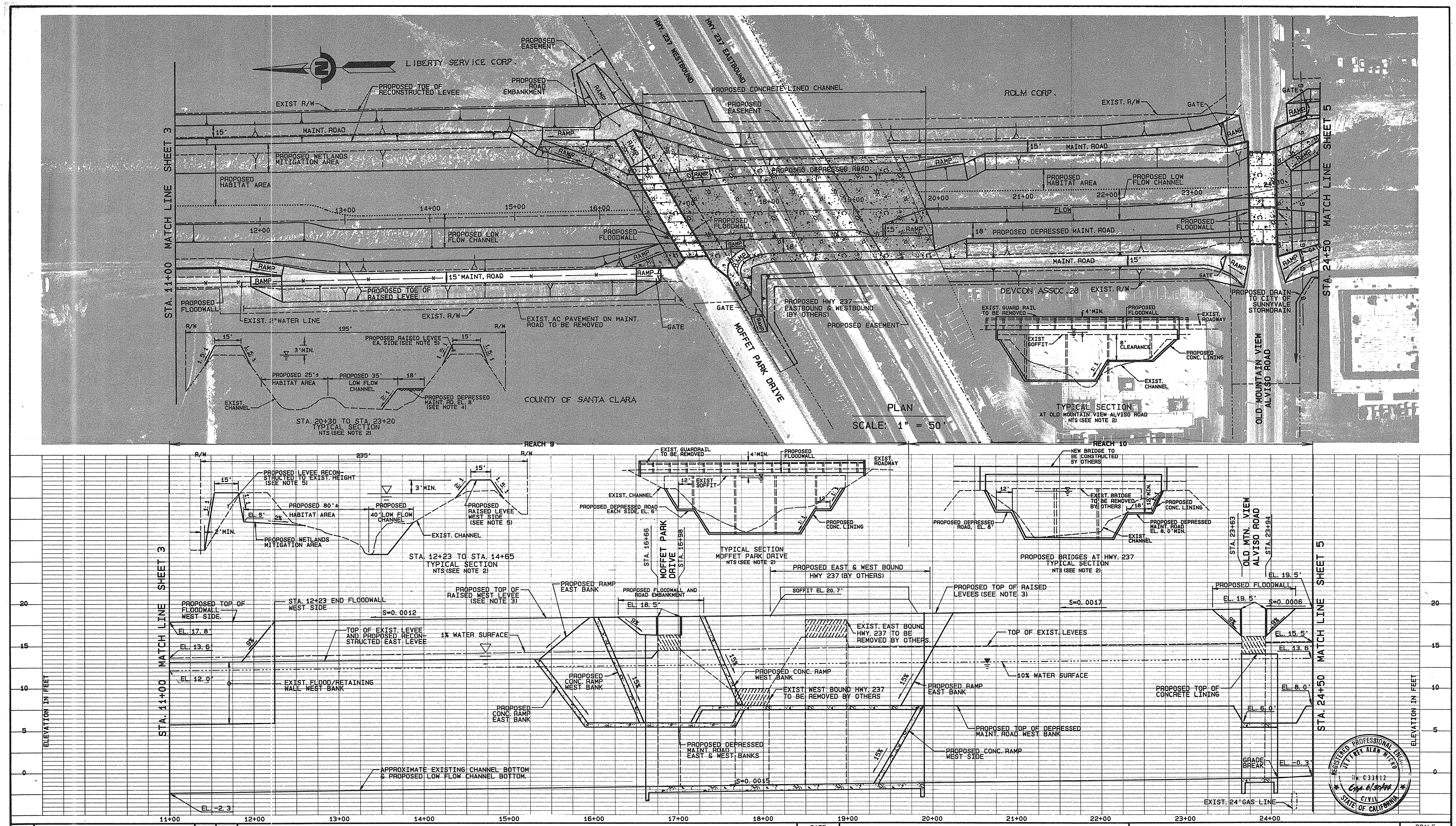
Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 35683
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25083

ENGINEERING APPROVAL
Stan N. Wolfe
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE
H. 1"=50'
V: 1"=5'
SHEET
3
OF 35


LIBERTY SERVICE CORP.
ROLM CORP.
DEVCON ASSOC 28
COUNTY OF SANTA CLARA
HWY. 237 WESTBOUND
HWY. 237 EASTBOUND
MOFFET PARK DRIVE
OLD MOUNTAIN VIEW ALVISO ROAD
STA. 11+00 MATCH LINE SHEET 3
STA. 24+50 MATCH LINE SHEET 5
PROPOSED EASEMENT
PROPOSED TOE OF RECONSTRUCTED LEVEE
PROPOSED ROAD EMBANKMENT
PROPOSED CONCRETE LINED CHANNEL
EXIST R/W
MAINT. ROAD
PROPOSED WETLANDS MITIGATION AREA
PROPOSED HABITAT AREA
PROPOSED LOW FLOW CHANNEL
PROPOSED FLOODWALL
PROPOSED DEPRESSED ROAD
18' PROPOSED DEPRESSED MAINT. ROAD
15' MAINT. ROAD
PROPOSED TOE OF RAISED LEVEE
EXIST. 2" WATER LINE
EXIST. AC PAVEMENT ON MAINT. ROAD TO BE REMOVED
GATE
RAMP
FLOW
PROPOSED HWY 237 EASTBOUND & WESTBOUND (BY OTHERS)
PROPOSED DRAIN TO CITY OF SUNNYVALE STORMDRAIN
STA. 20+30 TO STA. 23+20 TYPICAL SECTION NTS (SEE NOTE 2)
TYPICAL SECTION AT OLD MOUNTAIN VIEW ALVISO ROAD NTS (SEE NOTE 2)
PLAN SCALE: 1" = 50'
REACH 9
REACH 10
STA. 12+23 TO STA. 14+65 TYPICAL SECTION NTS (SEE NOTE 2)
TYPICAL SECTION MOFFET PARK DRIVE NTS (SEE NOTE 2)
PROPOSED BRIDGES AT HWY. 237 TYPICAL SECTION NTS (SEE NOTE 2)
PROPOSED EAST & WEST BOUND HWY 237 (BY OTHERS)
SOFFIT EL. 20.7'
S=0.0012
S=0.0017
S=0.0006
S=0.0015
1% WATER SURFACE
10% WATER SURFACE
TOP OF EXIST. LEVEES
PROPOSED TOP OF RAISED LEVEES (SEE NOTE 3)
APPROXIMATE EXISTING CHANNEL BOTTOM & PROPOSED LOW FLOW CHANNEL BOTTOM.
EXIST. 24' GAS LINE
ELEVATION IN FEET
11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00
JEFFREY ALAN MICKO
No. C33812
Exp. 6/30/94

REV	DESCRIPTION	DATE	APPR.

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

1. 1% FLOWRATE 4,300 CFS. 10% FLOWRATE 2,800 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
3. 4'MINIMUM FREEBOARD WITHIN 100'UPSTREAM & DOWNSTREAM OF BRIDGES & 3'MINIMUM FREEBOARD FOR ALL OTHER LEVEES
4. PLACE 12"OF ARMORING AGGREGATE ON DEPRESSED MAINT. ROADS AND 6" ON LEVEE MAINT. ROADS.
5. EMBANKMENTS WITH SLOPES GREATER THAN 2:1 SHALL BE REINFORCED.
6. SEDIMENT DEPTH AND STAGE MARKERS TO BE ADDED ON CHANNEL LINING UPSTREAM AND DOWNSTREAM OF BRIDGES.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE
DATE:
RECTIFICATION BY:

DATE
11/9/90
DESIGN
JM/KR
DRAWN
AH/CM/SL
CHECKED
JM

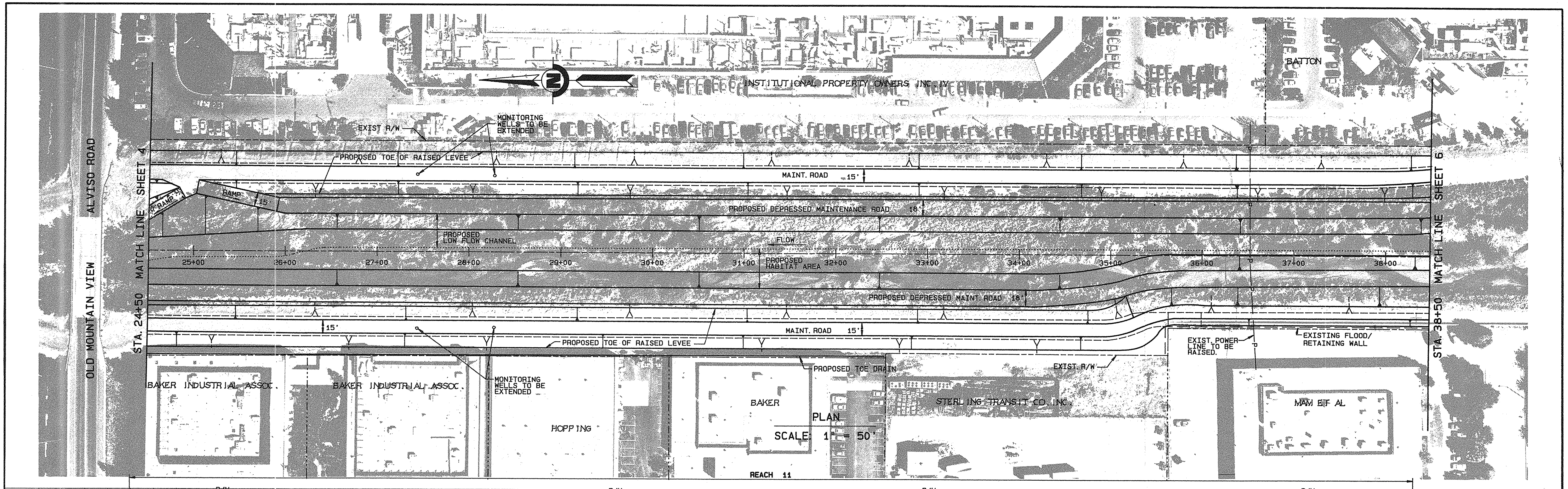
Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25083

ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

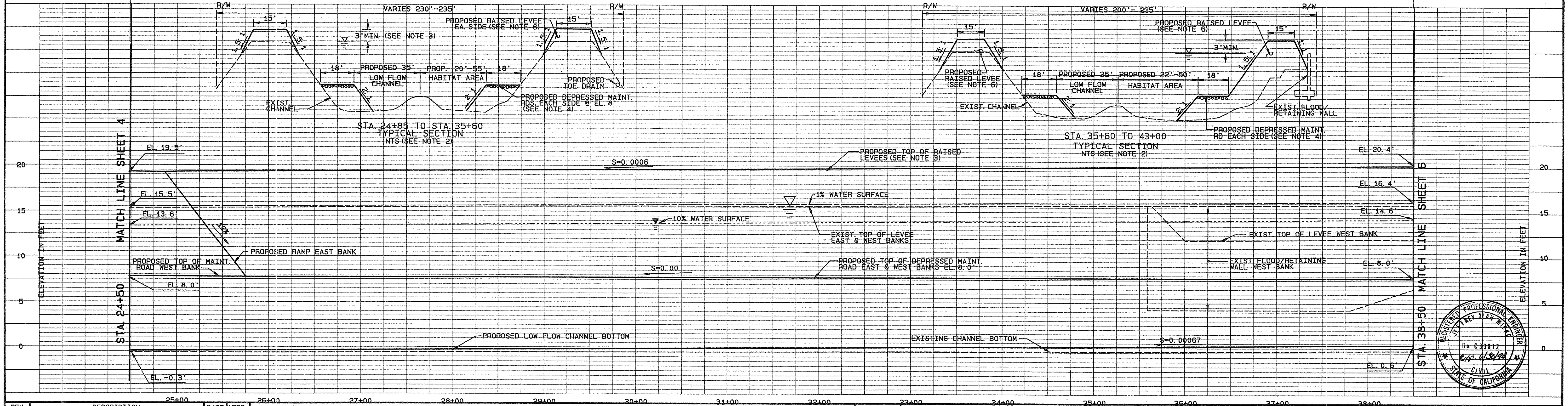
CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'
SHEET
4
OF 35


BATTON
INSTITUTIONAL PROPERTY OWNERS INC IV
MONITORING WELLS TO BE EXTENDED
EXIST R/W
PROPOSED TOE OF RAISED LEVEE
MAINT. ROAD 15'
RAMP
PROPOSED DEPRESSED MAINTENANCE ROAD 18'
PROPOSED LOW FLOW CHANNEL
FLOW
PROPOSED HABITAT AREA
25+00
26+00
27+00
28+00
29+00
30+00
31+00
32+00
33+00
34+00
35+00
36+00
37+00
38+00
PROPOSED DEPRESSED MAINT. ROAD 18'
MAINT. ROAD 15'
PROPOSED TOE OF RAISED LEVEE
EXISTING FLOOD/ RETAINING WALL
EXIST. POWER LINE TO BE RAISED.
EXIST. R/W
PROPOSED TOE DRAIN
ALVISO ROAD
OLD MOUNTAIN VIEW
STA. 24+50 MATCH LINE SHEET 4
STA. 38+50 MATCH LINE SHEET 6
BAKER INDUSTRIAL ASSOC.
BAKER INDUSTRIAL ASSOC.
MONITORING WELLS TO BE EXTENDED
HOPPING
BAKER
STERLING TRANSIT CO. INC.
MAM ET AL
REACH 11

PLAN

SCALE: 1" = 50'


R/W
VARIES 230'-235'
R/W
15'
1.5:1
3' MIN. (SEE NOTE 3)
PROPOSED RAISED LEVEE EA. SIDE (SEE NOTE 6)
15'
18'
PROPOSED 35' LOW FLOW CHANNEL
PROP. 20'-55' HABITAT AREA
18'
PROPOSED TOE DRAIN
EXIST. CHANNEL
2:1
PROPOSED DEPRESSED MAINT. RDS. EACH SIDE @ EL. 8' (SEE NOTE 4)
STA. 24+85 TO STA. 35+60 TYPICAL SECTION NTS (SEE NOTE 2)
R/W
VARIES 200'-235'
R/W
15'
PROPOSED RAISED LEVEE (SEE NOTE 6)
PROPOSED RAISED LEVEE (SEE NOTE 6)
3' MIN.
15'
18'
PROPOSED 35' LOW FLOW CHANNEL
PROPOSED 22'-50' HABITAT AREA
18'
EXIST. CHANNEL
EXIST. FLOOD/ RETAINING WALL
PROPOSED DEPRESSED MAINT. RD EACH SIDE (SEE NOTE 4)
STA. 35+60 TO 43+00 TYPICAL SECTION NTS (SEE NOTE 2)
EL. 19.5'
EL. 15.5'
EL. 13.6'
S=0.0006
PROPOSED TOP OF RAISED LEVEES (SEE NOTE 3)
1% WATER SURFACE
10% WATER SURFACE
EXIST. TOP OF LEVEE EAST & WEST BANKS
EL. 20.4'
EL. 16.4'
EL. 14.6'
EXIST. TOP OF LEVEE WEST BANK
EXIST. FLOOD/RETAINING WALL WEST BANK
PROPOSED RAMP EAST BANK
PROPOSED TOP OF MAINT. ROAD WEST BANK
S=0.00
PROPOSED TOP OF DEPRESSED MAINT. ROAD EAST & WEST BANKS EL. 8.0'
EL. 8.0'
EL. 8.0'
PROPOSED LOW FLOW CHANNEL BOTTOM
EXISTING CHANNEL BOTTOM
S=0.00067
EL. -0.3'
EL. 0.6'
ELEVATION IN FEET
20
15
10
5
0
STA. 24+50 MATCH LINE SHEET 4
STA. 38+50 MATCH LINE SHEET 6
25+00
26+00
27+00
28+00
29+00
30+00
31+00
32+00
33+00
34+00
35+00
36+00
37+00
38+00

No. C33812
Exp. 6/30/94

REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES

1. 1% FLOWRATE 4,300 CFS. 10% FLOWRATE 2,800 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
3. 4' MINIMUM FREEBOARD WITHIN 100' UPSTREAM & DOWNSTREAM OF BRIDGES, 3' MINIMUM FREEBOARD FOR ALL OTHER LEVEES.
4. PLACE 12" OF ARMORING AGGREGATE ON DEPRESSED MAINT. ROADS AND 6" ON LEVEE MAINT. ROADS.
5. SEDIMENT DEPTH AND STAGE MARKERS TO BE ADDED TO CHANNEL LINING UPSTREAM OF OLD MT. VIEW ALVISO ROAD.
6. EMBANKMENTS WITH SLOPES GREATER THAN 2:1 SHALL BE REINFORCED.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE DATE: RECTIFICATION BY:

DATE 10/9/90
DESIGN JM/KR
DRAWN AH/CM/SL
CHECKED JM

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO.

ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO.

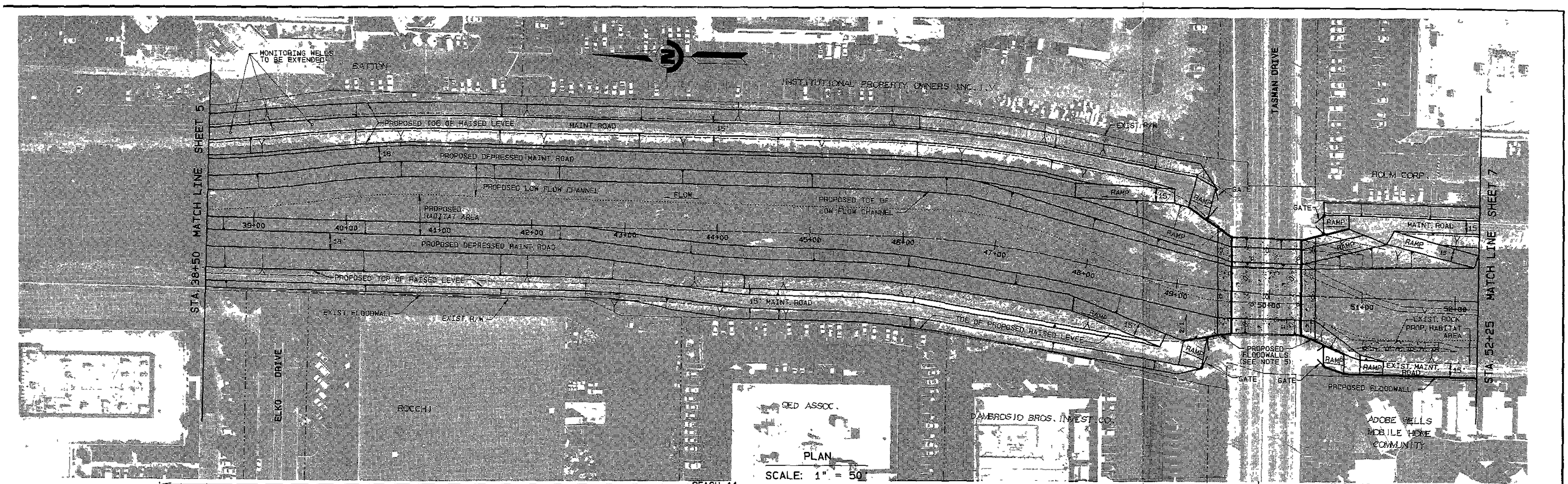
CALABAZAS CREEK

GUADALUPE SLOUGH TO MILLER AVENUE

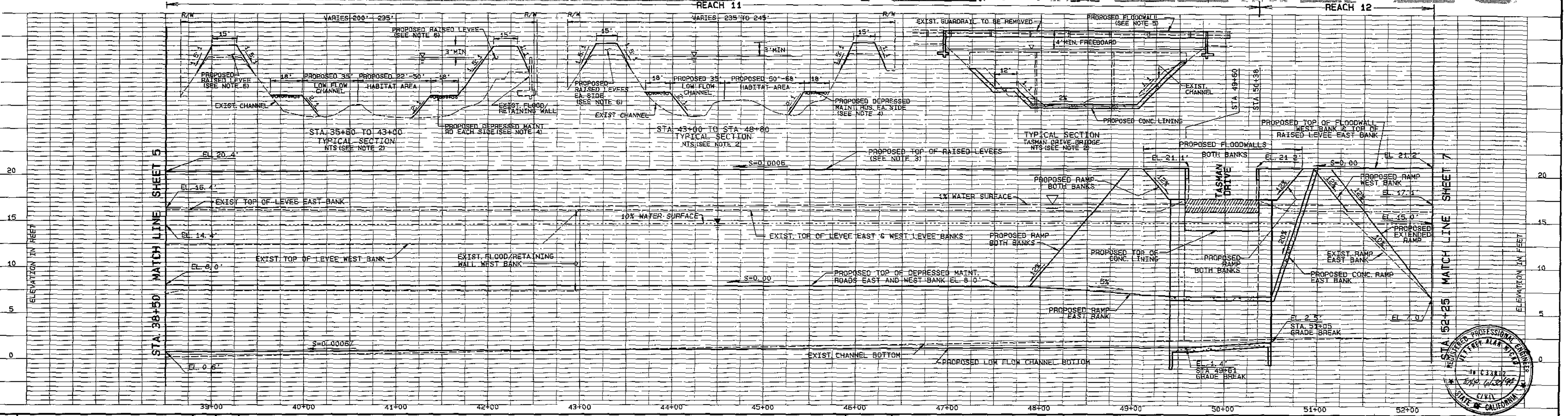
GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'

SHEET 5 OF 35


MONITORING WELLS TO BE EXTENDED
PATTON
INSTITUTIONAL PROPERTY OWNERS INC. I.V.
TASMAN DRIVE
PROPOSED TOE OF RAISED LEVEE
MAINT ROAD
EXIST. R/W
PROPOSED DEPRESSED MAINT ROAD
PROPOSED LOW FLOW CHANNEL
FLOW
PROPOSED HABITAT AREA
PROPOSED TOE OF LOW FLOW CHANNEL
ROLM CORP
GATE
RAMP
MAINT. ROAD
39+00
40+00
41+00
42+00
43+00
44+00
45+00
46+00
47+00
48+00
49+00
50+00
51+00
52+00
PROPOSED DEPRESSED MAINT ROAD
PROPOSED TOP OF RAISED LEVEE
15' MAINT ROAD
EXIST. FLOODWALL
EXIST. R/W
TOE OF PROPOSED RAISED LEVEE
PROPOSED FLOODWALLS (SEE NOTE 5)
EXIST. ROCK
PROP. HABITAT AREA
EXIST. MAINT. ROAD
PROPOSED FLOODWALL
STA. 38+50 MATCH LINE SHEET 5
STA. 52+25 MATCH LINE SHEET 7
ELKO DRIVE
ROCCHI
QED ASSOC.
DAMBROSIO BROS. INVEST. CO.
ADOBE WELLS MOBILE HOME COMMUNITY

PLAN
SCALE: 1" = 50'


REACH 11
REACH 12
R/W
VARIES 200' - 235'
PROPOSED RAISED LEVEE (SEE NOTE 6)
15'
3' MIN
PROPOSED RAISED LEVEE (SEE NOTE 6)
18'
PROPOSED 35' LOW FLOW CHANNEL
PROPOSED 22'-50' HABITAT AREA
EXIST. CHANNEL
EXIST. FLOOD/RETAINING WALL
PROPOSED DEPRESSED MAINT RD EACH SIDE (SEE NOTE 4)
STA. 35+80 TO 43+00
TYPICAL SECTION
NTS (SEE NOTE 2)
VARIES 235' TO 245'
PROPOSED RAISED LEVEES EA. SIDE (SEE NOTE 6)
PROPOSED 35' LOW FLOW CHANNEL
PROPOSED 50'-68' HABITAT AREA
PROPOSED DEPRESSED MAINT. RDS. EA. SIDE (SEE NOTE 4)
STA. 43+00 TO STA. 48+80
TYPICAL SECTION
NTS (SEE NOTE 2)
EXIST. GUARDRAIL TO BE REMOVED
PROPOSED FLOODWALL (SEE NOTE 5)
4' MIN. FREEBOARD
12"
2%
EXIST. CHANNEL
PROPOSED CONC. LINING
TYPICAL SECTION
TASMAN DRIVE BRIDGE
NTS (SEE NOTE 2)
STA. 49+60
STA. 50+38
EL. 20.4'
EL. 16.4'
EL. 14.4'
EL. 8.0'
EL. 0.6'
S=0.0005
S=0.00
S=0.00067
PROPOSED TOP OF RAISED LEVEES (SEE NOTE 3)
EXIST. TOP OF LEVEE EAST BANK
10% WATER SURFACE
1% WATER SURFACE
EXIST. TOP OF LEVEE WEST BANK
EXIST. FLOOD/RETAINING WALL WEST BANK
EXIST. TOP OF LEVEE EAST & WEST LEVEE BANKS
PROPOSED TOP OF DEPRESSED MAINT. ROADS EAST AND WEST BANK EL. 8.0'
PROPOSED RAMP BOTH BANKS
PROPOSED RAMP EAST BANK
PROPOSED TOP OF CONC. LINING
PROPOSED RAMP BOTH BANKS
PROPOSED FLOODWALLS BOTH BANKS
EL. 21.1'
EL. 21.2'
TASMAN DRIVE
PROPOSED TOP OF FLOODWALL WEST BANK & TOP OF RAISED LEVEE EAST BANK
PROPOSED RAMP WEST BANK
EL. 17.1'
EL. 15.0'
PROPOSED EXTENDED RAMP
EXIST. RAMP EAST BANK
PROPOSED CONC. RAMP EAST BANK
EL. 7.0'
EL. 2.5'
STA. 51+05 GRADE BREAK
EL. 1.4'
STA. 49+61 GRADE BREAK
12%
10%
20%
5%
EXIST. CHANNEL BOTTOM
PROPOSED LOW FLOW CHANNEL BOTTOM
ELEVATION IN FEET
0
5
10
15
20
STA. 38+50 MATCH LINE SHEET 5
STA. 52+25 MATCH LINE SHEET 7
39+00
40+00
41+00
42+00
43+00
44+00
45+00
46+00
47+00
48+00
49+00
50+00
51+00
52+00

JEFFREY ALAN MICKO
No. C33812
Exp. 6/30/94
CIVIL
STATE OF CALIFORNIA

REV	DESCRIPTION	DATE	APPR.

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
←3 INCHES ON ORIGINAL PLAN→

REFERENCE INFORMATION AND NOTES

1. 1% FLOWRATE 4,300 CFS, 10% FLOWRATE 2,800 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
3. *4' MINIMUM FREEBOARD WITHIN 100' UPSTREAM AND DOWNSTREAM OF BRIDGES &* 3' MINIMUM FREEBOARD FOR ALL OTHER LEVEES.
4. PLACE 12" OF ARMORING AGGREGATE ON DEPRESSED MAINT. ROAD AND 6" ON LEVEE MAINT. ROADS
5. FLOODWALLS TO BE ARCHITECTURALLY TREATED.
6. *EMBANKMENTS WITH SLOPES GREATER THAN 2:1 SHALL BE REINFORCED.*
7. SEDIMENT DEPTH AND STAGE MARKERS TO BE ADDED TO CHANNEL LINING UPSTREAM AND DOWNSTREAM OF TASMAN DRIVE.

PHOTOGRAPHY BY: *AIR FLIGHT SERVICE* *DATE:* *RECTIFICATION BY:*

DATE 10/9/90
DESIGN JM/KR
DRAWN AH/CM/SL
CHECKED JM

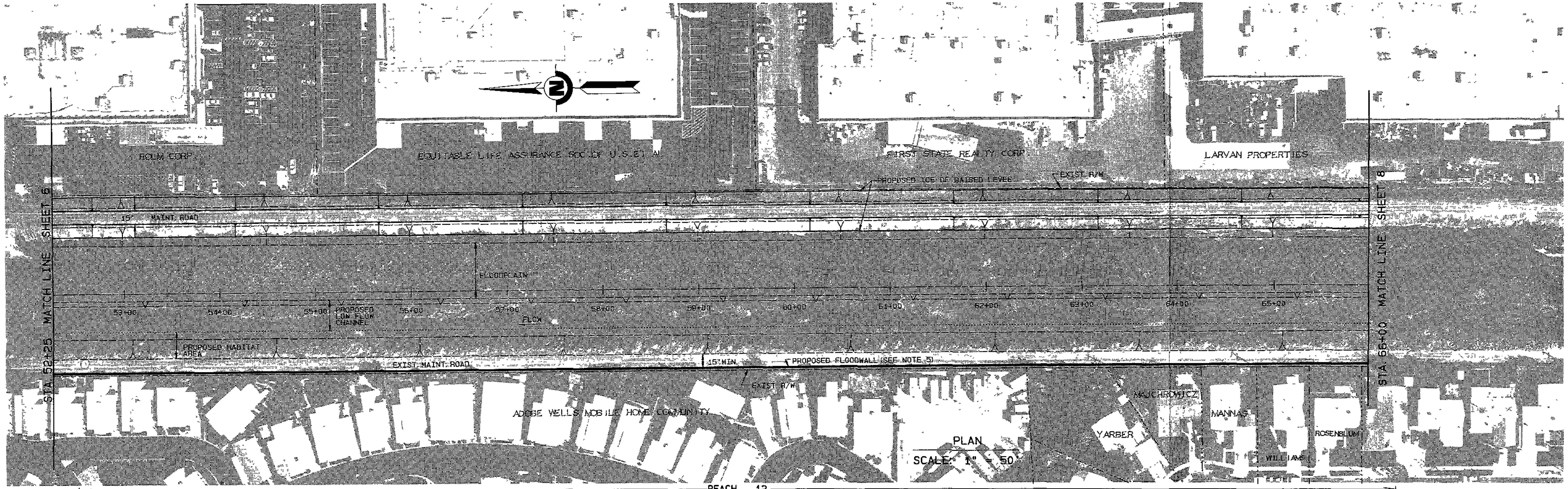
Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

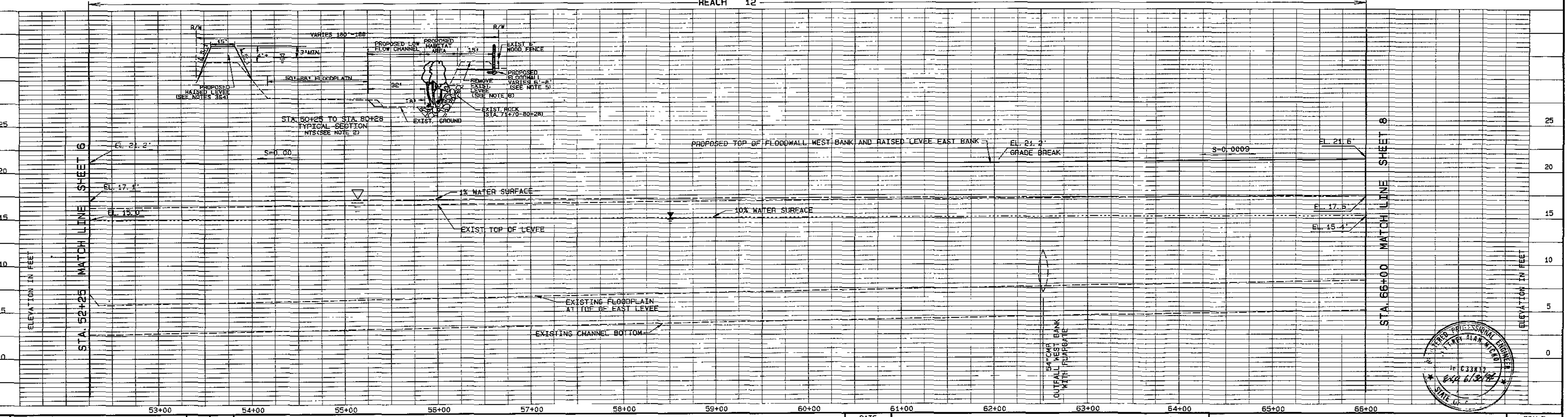
ENGINEERING APPROVAL
San N. Wolfe
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE H. 1"=50' V. 1"=5'
SHEET 6 OF 35



PLAN
SCALE: 1" = 50'



REV.	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

1. 1% FLOWRATE 4300 CFS. AND 10% FLOWRATE 2800 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
3. PLACE 6"OF ARMORING AGGREGATE ON LEVEE MAINT. ROADS
4. EMBANKMENTS WITH SLOPES GREATER THAN 2:1 SHALL BE REINFORCED.
5 PROPOSED FLOODWALLS TO BE ARCHITECTURALLY TREATED
6. REMOVE EXISTING LEVEE, WHERE POSSIBLE, TO PROVIDE A VERTICAL DISTANCE OF 6 FEET BETWEEN TOP OF THE FLOODWALL OR EXISTING FENCE AND TOP OF LEVEE.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE DATE: RECTIFICATION BY:

DATE 10/9/90
DESIGN JM/KR
DRAWN AH/CM/SL
CHECKED JM

Santa Clara Valley Water District

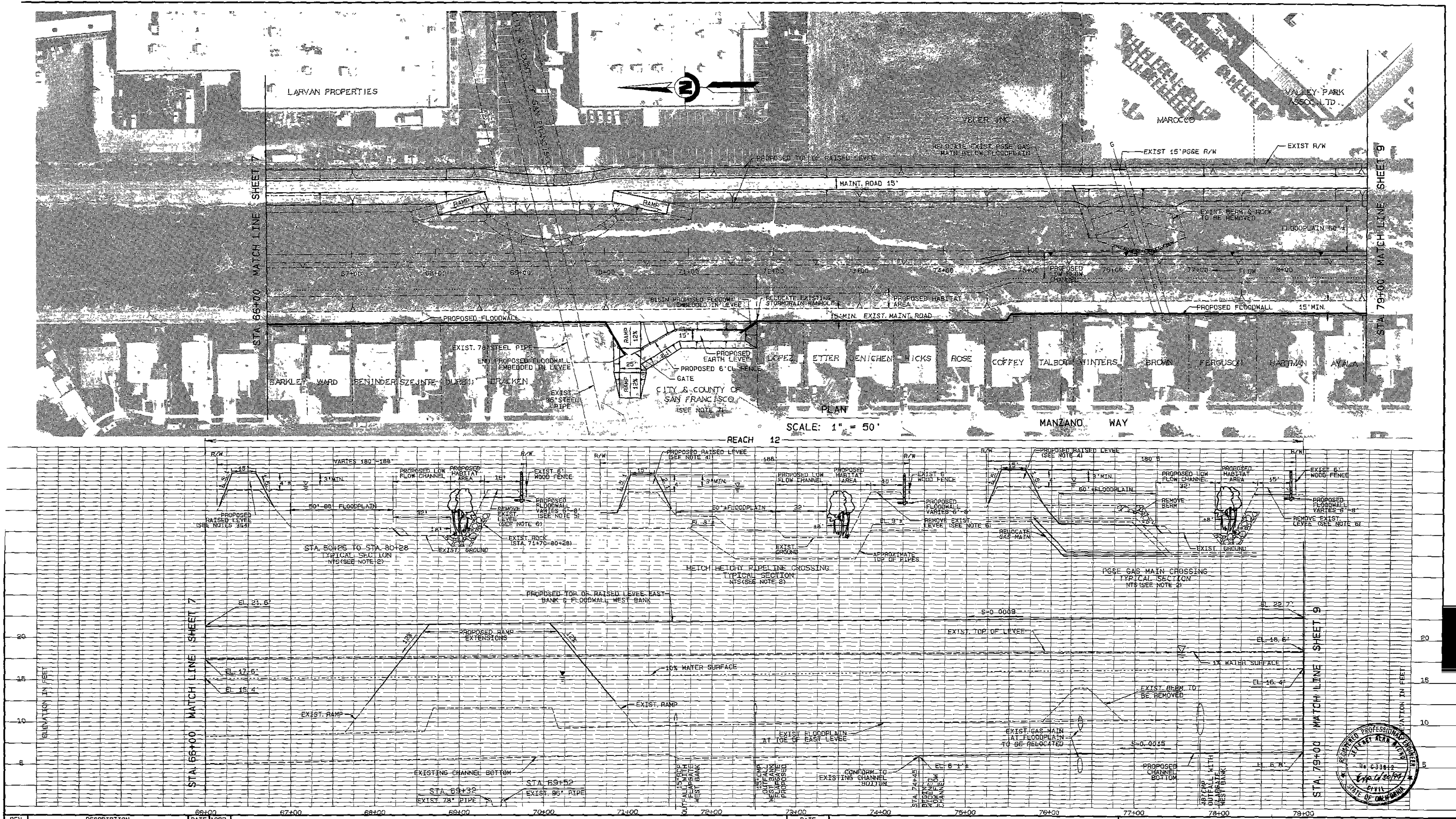
ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
Stan N. Wolfe
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE
H. 1"=50'
V. 1"=5'

SHEET
7
OF 35


LARVAN PROPERTIES
CITY & COUNTY OF SAN FRANCISCO
VECER INC
MAROCCO
VALLEY PARK ASSOC. LTD.
RELOCATE EXIST PG&E GAS MAIN BELOW FLOODPLAIN
EXIST 15' PG&E R/W
EXIST R/W
PROPOSED TOE OF RAISED LEVEE
MAINT. ROAD 15'
RAMP
RAMP
EXIST BERM & ROCK TO BE REMOVED
FLOODPLAIN 60'±
STA 66+00 MATCH LINE SHEET 7
STA 79+00 MATCH LINE SHEET 9
67+00
68+00
69+00
70+00
71+00
72+00
73+00
74+00
75+00
PROPOSED LOW FLOW CHANNEL
76+00
77+00
FLOW
78+00
BEGIN PROPOSED FLOODWALL EMBEDDED IN LEVEE
RELOCATE EXISTING STORMDRAIN MANHOLE
PROPOSED HABITAT AREA
PROPOSED FLOODWALL
15' MIN. EXIST. MAINT. ROAD
PROPOSED FLOODWALL
15' MIN.
EXIST. 78" STEEL PIPE
END PROPOSED FLOODWALL EMBEDDED IN LEVEE
RAMP 12%
25'
RAMP 12%
15'
PROPOSED EARTH LEVEE
PROPOSED 6' CL FENCE
GATE
CITY & COUNTY OF SAN FRANCISCO (SEE NOTE 7)
EXIST 96" STEEL PIPE
BARKLEY
WARD
BENINDER
SZEJNTE
DURSO
BRACKEN
LOPEZ
ETTER
JENICHEN
HICKS
ROSE
COFFEY
TALBOT
WINTERS
BROWN
FERGUSON
HARTMAN
AYALA
PLAN
SCALE: 1" = 50'
MANZANO WAY
REACH 12
R/W
VARIES 180'-188'
15'
3' MIN.
PROPOSED RAISED LEVEE (SEE NOTES 3&4)
50'-68' FLOODPLAIN
PROPOSED LOW FLOW CHANNEL
PROPOSED HABITAT AREA
32'
18'
EXIST 6' WOOD FENCE
PROPOSED FLOODWALL VARIES 6'-8' (SEE NOTE 5)
REMOVE EXIST. LEVEE (SEE NOTE 6)
EXIST. ROCK (STA. 71+70-80+28)
EXIST. GROUND
STA. 50+26 TO STA. 80+28 TYPICAL SECTION NTS (SEE NOTE 2)
PROPOSED RAISED LEVEE (SEE NOTE 4)
188'
50'± FLOODPLAIN
EL. 8'±
EXIST. GROUND
APPROXIMATE TOP OF PIPES
HETCH HETCHY PIPELINE CROSSING TYPICAL SECTION NTS (SEE NOTE 2)
180.5'
60'± FLOODPLAIN
REMOVE BERM
RELOCATE GAS MAIN
EXIST. GROUND
REMOVE EXIST. LEVEE (SEE NOTE 6)
PG&E GAS MAIN CROSSING TYPICAL SECTION NTS (SEE NOTE 2)
PROPOSED TOP OF RAISED LEVEE EAST BANK & FLOODWALL WEST BANK
EL. 21.6'
S=0.0009
EL. 22.7'
PROPOSED RAMP EXTENSIONS
12%
12%
EXIST. TOP OF LEVEE
EL. 18.6'
1% WATER SURFACE
EL. 17.6'
10% WATER SURFACE
EL. 15.4'
EL. 16.4'
EXIST. BERM TO BE REMOVED
EXIST. RAMP
EXIST. RAMP
EXIST. FLOODPLAIN AT TOE OF EAST LEVEE
EXIST. GAS MAIN AT FLOODPLAIN TO BE RELOCATED
S=0.0015
EXISTING CHANNEL BOTTOM
CONFORM TO EXISTING CHANNEL BOTTOM
EL. 6.1'±
PROPOSED CHANNEL BOTTOM
EL. 6.8'
STA. 69+32 EXIST. 78" PIPE
STA. 69+52 EXIST. 96" PIPE
15" RCP OUTFALL WITH FLAPGATE WEST BANK
15" CMP OUTFALL WEST BANK FLAPGATE PROPOSED
STA. 74+45 BEGIN WIDENED LOW FLOW CHANNEL
48" CMP OUTFALL WITH FLAPGATE WEST BANK
ELEVATION IN FEET
20
15
10
5
66+00
67+00
68+00
69+00
70+00
71+00
72+00
73+00
74+00
75+00
76+00
77+00
78+00
79+00

REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

1. 1% FLOWRATE 4300 CFS. 10% FLOWRATE 2800 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
3. PLACE 6" OF ARMORING AGGREGATE ON LEVEE MAINT. ROADS
4. EMBANKMENTS WITH SLOPES GREATER THAN 2:1 SHALL BE REINFORCED
5. PROPOSED FLOODWALLS TO BE ARCHITECTURALLY TREATED
6. REMOVE EXISTING LEVEE, WHERE POSSIBLE, TO PROVIDE A VERTICAL DISTANCE OF 6 FEET BETWEEN TOP OF THE FLOODWALL OR EXISTING FENCE AND TOP OF LEVEE.
7. ALL WORK WITHIN CITY & COUNTY OF SAN FRANCISCO R/W SHALL HAVE APPROPRIATE APPROVALS & PERMITS.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE DATE: RECTIFICATION BY:

DATE 10/9/90
DESIGN JM/KR
DRAWN AH/SL/CM
CHECKED JM

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

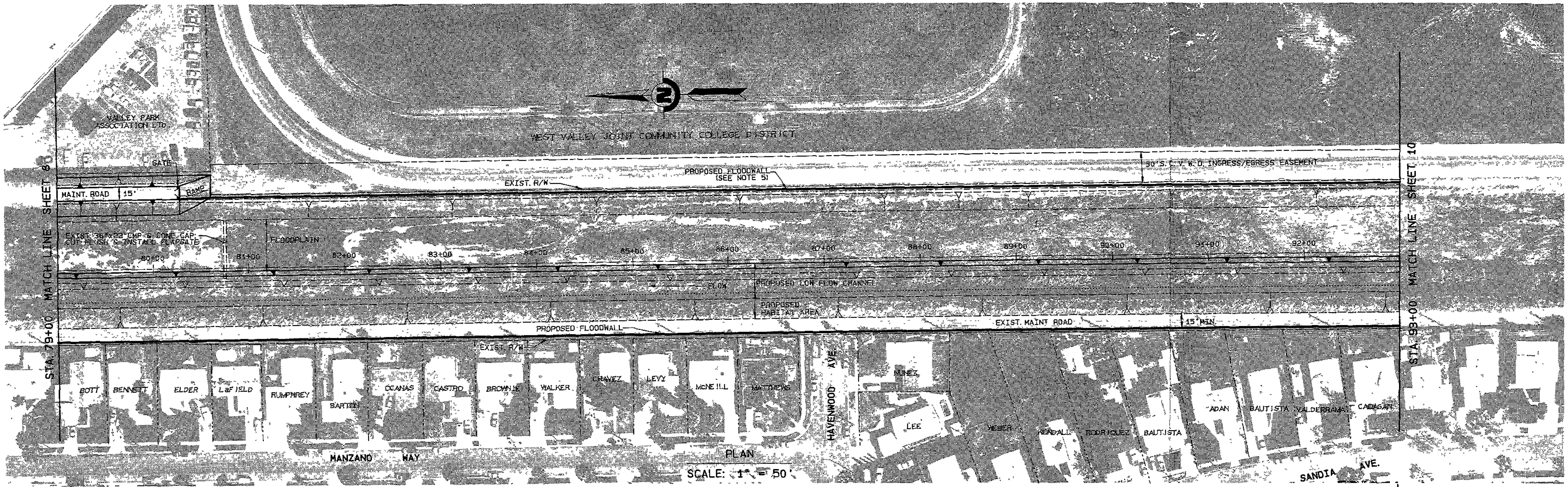
ENGINEERING APPROVAL
Stan N. Wolfe
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

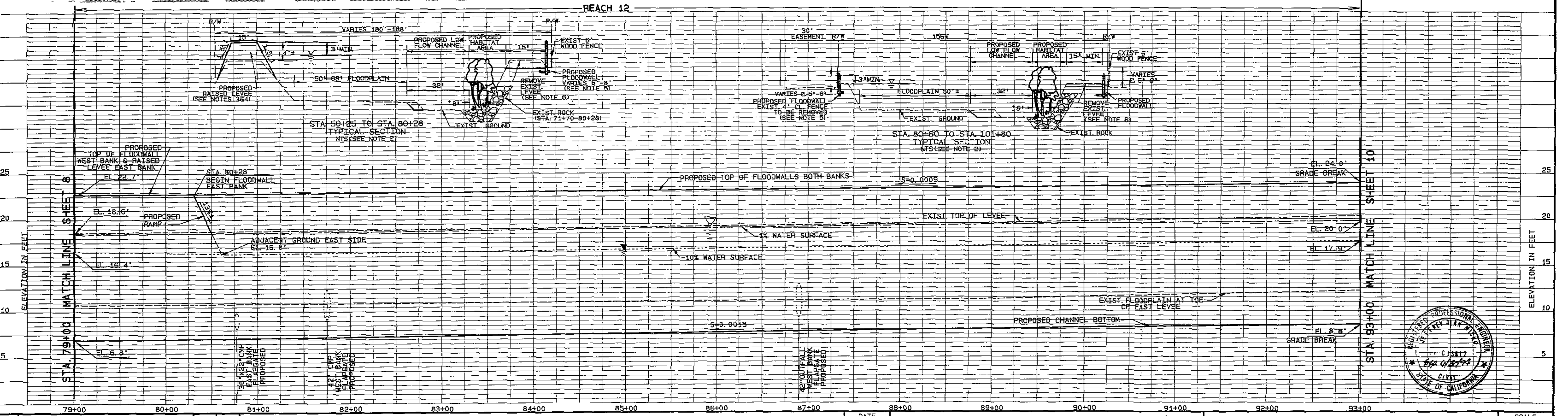
CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'

SHEET
8
OF 35

No. C33812
Exp. 6/30/94





C 33812

REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

1. 1% FLOWRATE 4300 CFS. 10% FLOWRATE 2800 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
3. PLACE 6" OF ARMORING AGGREGATE ON LEVEE MAINT. ROADS
4. EMBANKMENTS WITH SLOPES GREATER THAN 2:1 SHALL BE REINFORCED.
5. FLOODWALL TO BE ARCHITECTURALLY TREATED.
6. REMOVE EXISTING LEVEE, WHERE POSSIBLE, TO PROVIDE A VERTICAL DISTANCE OF 6 FEET BETWEEN THE TOP OF THE FLOODWALL OR EXISTING FENCE AND TOP OF LEVEE

PHOTOGRAPHY BY: AIR FLIGHT SERVICE
DATE:
RECTIFICATION BY:

DATE 10/9/90
DESIGN JM/KR
DRAWN A1/CM/SL
CHECKED JM

Santa Clara Valley Water District

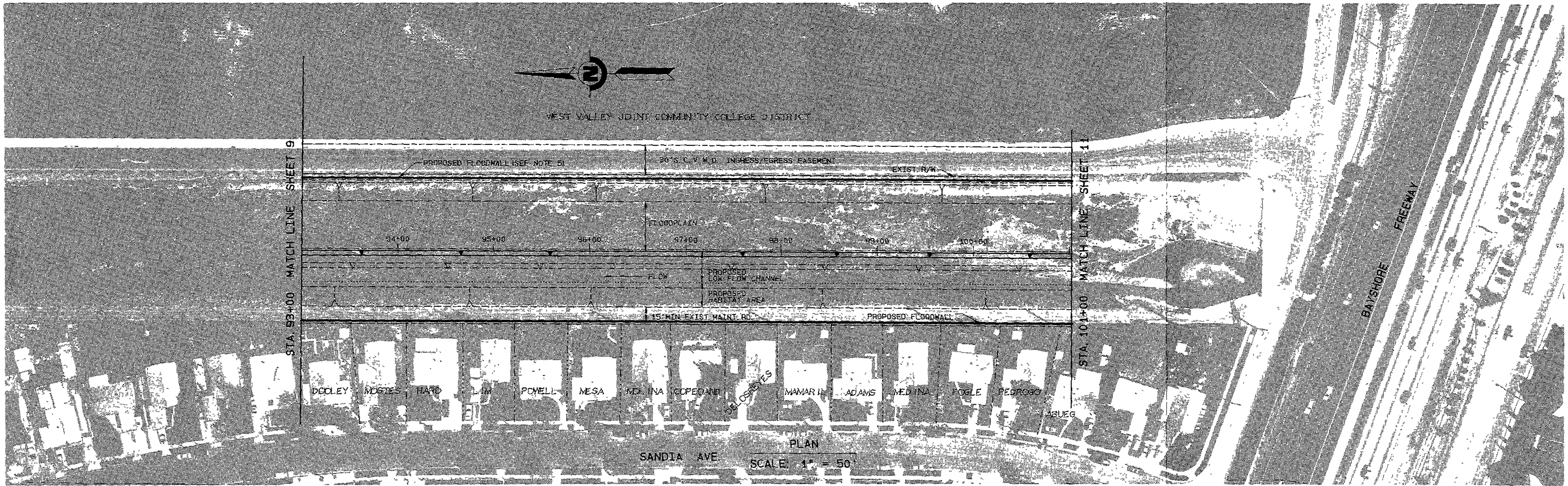
ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25083

ENGINEERING APPROVAL
Stan n. Wolfe
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

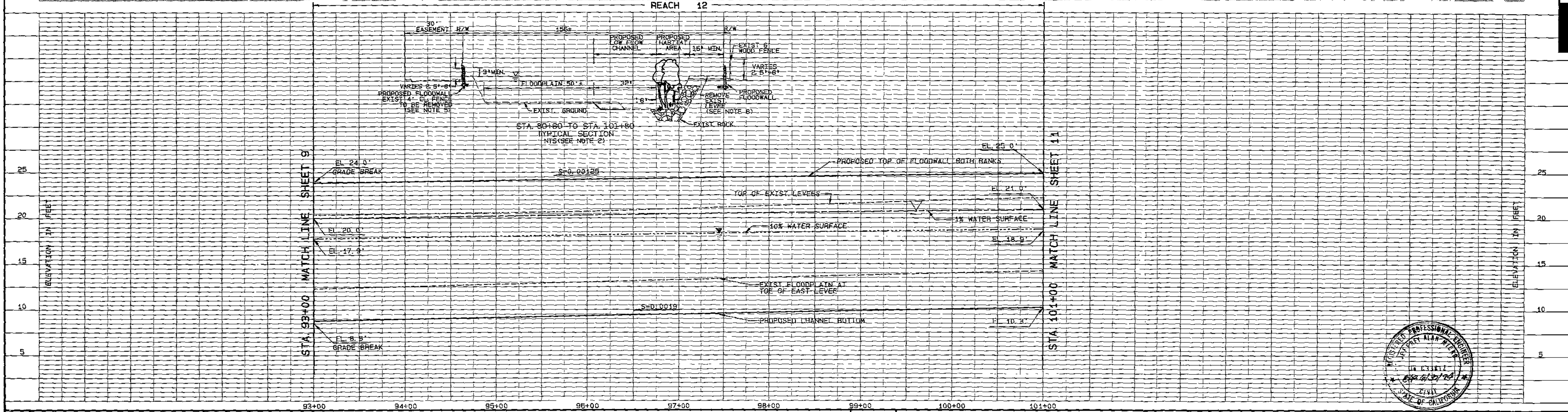
CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'

SHEET 9 OF 35



PLAN
SCALE: 1" = 50'



REGISTERED PROFESSIONAL ENGINEER JEFFREY ALAN MICKE No. C33812 EXP. 6/30/94 CIVIL STATE OF CALIFORNIA

REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

1. 1% FLOWRATE 4300 CFS, 10% FLOWRATE 2800 CFS.
2. TYPICAL SECTION DRAWN LOOKING UPSTREAM
3. PLACE 6" OF ARMORING AGGREGATE ON LEVEE MAINT ROADS.
4. EMBANKMENTS WITH SLOPES GREATER THAN 2:1 SHALL BE REINFORCED.
5. PROPOSED FLOODWALLS TO BE ARCHITECTURALLY TREATED.
6. REMOVE EXISTING LEVEE WHERE POSSIBLE TO PROVIDE A VERTICAL DISTANCE OF 6 FEET BETWEEN TOP OF THE FLOODWALL OR EXISTING FENCE AND TOP OF LEVEE.

PHOTOGRAPHY BY

RECTIFICATION BY:

DATE 10/9/90
DESIGN JM/KR
DRAWN A1/CM/SL
CHECKED JM

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Jeff Micke
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
Stan S. Wolfe
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

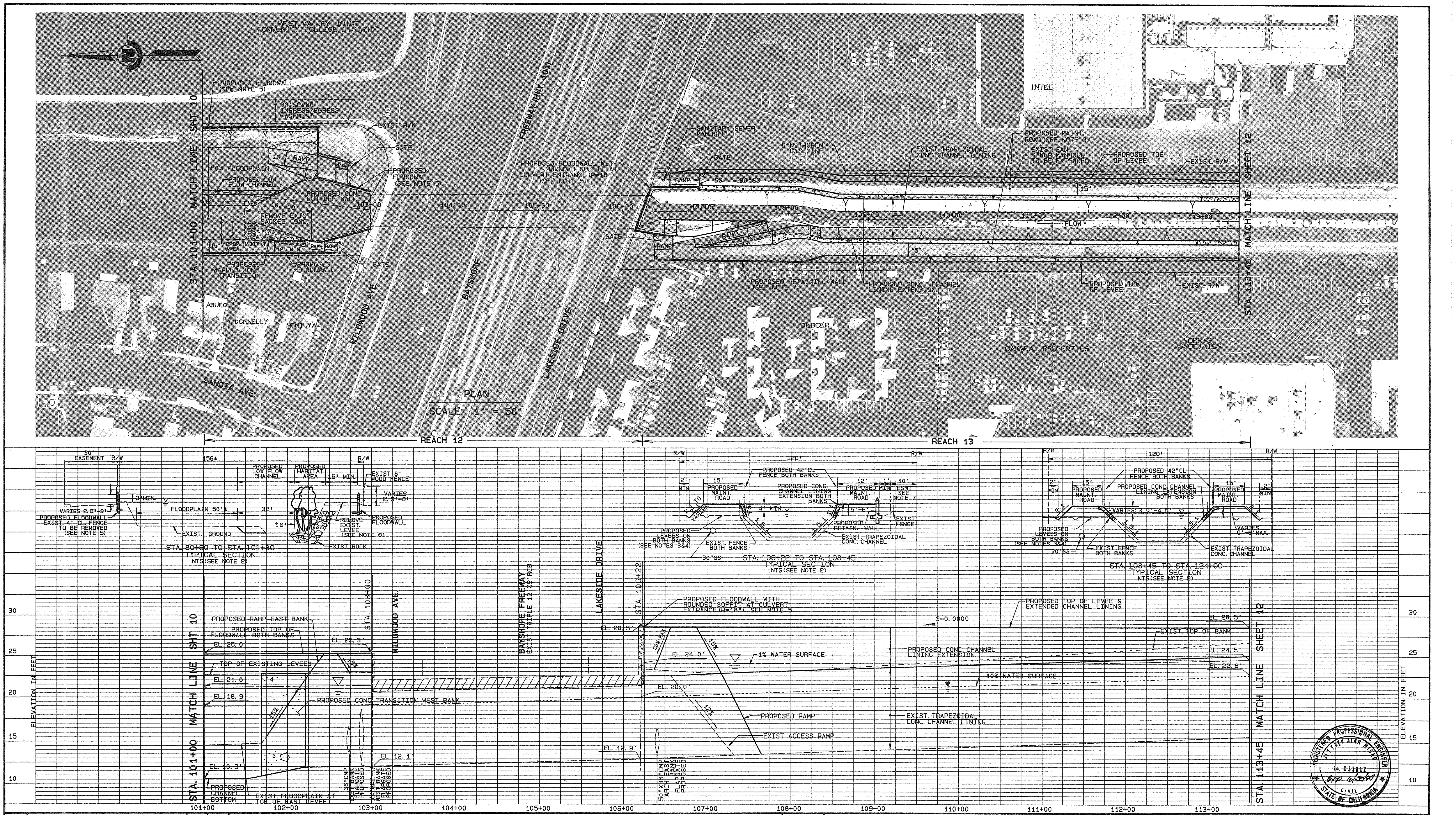
CALABAZAS CREEK

GUADALUPE SLOUGH TO MILLER AVENUE

GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'

SHEET
10
OF 35


WEST VALLEY JOINT COMMUNITY COLLEGE DISTRICT
N
PROPOSED FLOODWALL (SEE NOTE 5)
30' SCVWD INGRESS/EGRESS EASEMENT
EXIST. R/W
GATE
RAMP
50± FLOODPLAIN
PROPOSED LOW FLOW CHANNEL
PROPOSED CONC. CUT-OFF WALL
PROPOSED FLOODWALL (SEE NOTE 5)
REMOVE EXIST. SACKED CONC.
PROP. HABITAT AREA
PROPOSED WARPED CONC. TRANSITION
PROPOSED FLOODWALL
FREEWAY (HWY. 101)
BAYSHORE
LAKESIDE DRIVE
WILDWOOD AVE.
SANDIA AVE.
ABUEG
DONNELLY
MONTUYA
PROPOSED FLOODWALL WITH ROUNDED SOFFIT AT CULVERT ENTRANCE (R=18"). (SEE NOTE 5)
SANITARY SEWER MANHOLE
6" NITROGEN GAS LINE
EXIST. TRAPEZOIDAL CONC. CHANNEL LINING
PROPOSED MAINT. ROAD (SEE NOTE 3)
EXIST. SAN. SEWER MANHOLE TO BE EXTENDED
PROPOSED TOE OF LEVEE
INTEL
FLOW
PROPOSED RETAINING WALL (SEE NOTE 7)
PROPOSED CONC. CHANNEL LINING EXTENSION
DEBOER
OAKMEAD PROPERTIES
MORRIS ASSOCIATES
STA. 101+00 MATCH LINE SHT 10
STA. 113+45 MATCH LINE SHEET 12
PLAN
SCALE: 1" = 50'
REACH 12
REACH 13
STA. 80+60 TO STA. 101+80 TYPICAL SECTION NTS (SEE NOTE 2)
STA. 106+22 TO STA. 108+45 TYPICAL SECTION NTS (SEE NOTE 2)
STA. 108+45 TO STA. 124+00 TYPICAL SECTION NTS (SEE NOTE 2)
PROPOSED 42" CL FENCE BOTH BANKS
PROPOSED CONC. CHANNEL LINING EXTENSION BOTH BANKS
PROPOSED LEVEES ON BOTH BANKS (SEE NOTES 3&4)
EXIST. FENCE BOTH BANKS
30"SS
BAYSHORE FREEWAY EXIST. TRIPLE 12'X9' RCB
STA. 103+00
STA. 106+22
PROPOSED RAMP EAST BANK
PROPOSED TOP OF FLOODWALL BOTH BANKS
TOP OF EXISTING LEVEES
PROPOSED CONC. TRANSITION WEST BANK
PROPOSED TOP OF LEVEE & EXTENDED CHANNEL LINING
S=0.0000
EXIST. TOP OF BANK
1% WATER SURFACE
10% WATER SURFACE
PROPOSED CONC. CHANNEL LINING EXTENSION
PROPOSED RAMP
EXIST. ACCESS RAMP
EXIST. TRAPEZOIDAL CONC. CHANNEL LINING
PROPOSED CHANNEL BOTTOM
EXIST. FLOODPLAIN AT TOE OF EAST LEVEE
ELEVATION IN FEET
101+00
102+00
103+00
104+00
105+00
106+00
107+00
108+00
109+00
110+00
111+00
112+00
113+00

REV	DESCRIPTION	DATE	APPR.

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

1. REACH 12; 1% FLOWRATE 4300 CFS, 10% FLOWRATE 2800 CFS & REACH 13; 1% FLOWRATE 4160 CFS, 10% FLOWRATE 2700 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
3. PLACE 6" OF ARMORING AGGREGATE ON LEVEE MAINTENANCE ROADS.
4. REMOVE EXISTING 42" C. L. FENCE AND RELOCATE DRAINAGE DITCH AND DRAIN INLETS.
5. PROPOSED FLOODWALL TO BE ARCHITECTURALLY TREATED.
6. REMOVE EXISTING LEVEE, WHERE POSSIBLE, TO PROVIDE A VERTICAL DISTANCE OF 6 FEET BETWEEN THE TOP OF THE FLOODWALL OR EXISTING FENCE AND TOP OF LEVEE.
7. SEE EASEMENT AGREEMENT RECORDED ON APRIL 17, 1983 S. C. V. W. D. PERMIT NO. 83208.
8. SEDIMENT DEPTH AND STAGE MARKERS TO BE ADDED ON WINGWALLS UPSTREAM AND DOWNSTREAM OF HWY 101.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE
DATE:
RECTIFICATION BY:

DATE 10/19/90
DESIGN JM/KR
DRAWN CM/SL
CHECKED JM

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R. C. E. NO. 33812
Randy Talley
DIVISION ENGINEER R. C. E. NO. 25093

ENGINEERING APPROVAL
Stan D. Wolfe
HEAD, PROJECT DEVELOPMENT BRANCH R. C. E. NO. 20474

No. C33812
Exp. 6/30/91

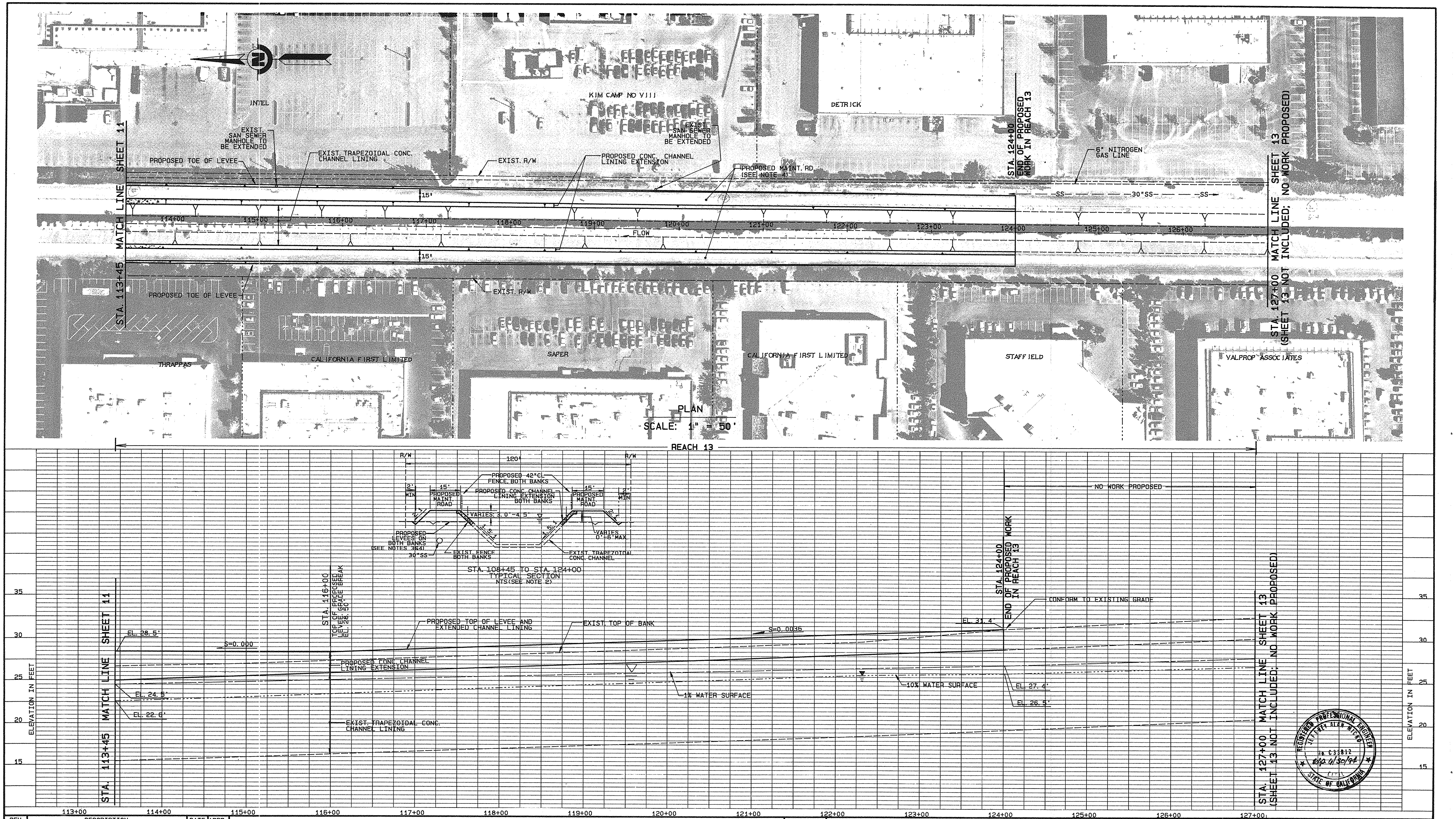
CALABAZAS CREEK

GUADALUPE SLOUGH TO MILLER AVENUE

GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'

SHEET
11
OF 35


INTEL
KIM CAMP NO VIII
DETRICK
EXIST. SAN SEWER MANHOLE TO BE EXTENDED
EXIST. SAN SEWER MANHOLE TO BE EXTENDED
EXIST. TRAPEZOIDAL CONC. CHANNEL LINING
PROPOSED TOE OF LEVEE
EXIST. R/W
PROPOSED CONC. CHANNEL LINING EXTENSION
PROPOSED MAINT. RD. (SEE NOTE 4)
STA. 124+00 END OF PROPOSED WORK IN REACH 13
6" NITROGEN GAS LINE
SS
30"SS
15'
15'
114+00
115+00
116+00
117+00
118+00
119+00
120+00
121+00
122+00
123+00
124+00
125+00
126+00
FLOW
STA. 113+45 MATCH LINE SHEET 11
STA. 127+00 MATCH LINE SHEET 13 (SHEET 13 NOT INCLUDED; NO WORK PROPOSED)
PROPOSED TOE OF LEVEE
EXIST. R/W
THRAPPAS
CALIFORNIA FIRST LIMITED
SAPER
CALIFORNIA FIRST LIMITED
STAFFIELD
VALPROP ASSOCIATES
PLAN
SCALE: 1" = 50'
REACH 13
R/W
120'
R/W
PROPOSED 42"CL FENCE, BOTH BANKS
2' MIN
15'
PROPOSED MAINT. ROAD
PROPOSED CONC. CHANNEL LINING EXTENSION BOTH BANKS
15'
PROPOSED MAINT. ROAD
2' MIN
VARIES: 3.0'-4.5'
2:1
1.5:1
1.5:1
2:1
PROPOSED LEVEES ON BOTH BANKS (SEE NOTES 3&4)
30"SS
EXIST. FENCE BOTH BANKS
VARIES 0'-6'MAX
EXIST. TRAPEZOIDAL CONC. CHANNEL
STA. 108+45 TO STA. 124+00
TYPICAL SECTION
NTS(SEE NOTE 2)
NO WORK PROPOSED
STA. 116+00 TOP OF PROPOSED LEVEE GRADE BREAK EL. 28.50'
STA. 124+00 END OF PROPOSED WORK IN REACH 13
CONFORM TO EXISTING GRADE
EL. 28.5'
S=0.000
PROPOSED TOP OF LEVEE AND EXTENDED CHANNEL LINING
EXIST TOP OF BANK
S=0.0036
EL. 31.4'
PROPOSED CONC. CHANNEL LINING EXTENSION
1% WATER SURFACE
10% WATER SURFACE
EL. 27.4'
EL. 26.5'
EL. 24.5'
EL. 22.6'
EXIST. TRAPEZOIDAL CONC. CHANNEL LINING
ELEVATION IN FEET
35
30
25
20
15
113+00
114+00
115+00
116+00
117+00
118+00
119+00
120+00
121+00
122+00
123+00
124+00
125+00
126+00
127+00

JEFFREY ALAN MICKO No. C33812 Exp. 6/30/94

REV	DESCRIPTION	DATE	APPR.

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

1. 1% FLOWRATE 4160 CFS, 10% FLOWRATE 2700 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM
3. REMOVE EXISTING 42" C.L. FENCE AND RELOCATE DRAINAGE DITCH AND DRAIN INLETS.
4. PLACE 6" OF ARMORING AGGREGATE ON LEVEE MAINTENANCE ROADS.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE
DATE:
RECTIFICATION BY:

DATE 10/9/90
DESIGN KR
DRAWN CAM
CHECKED J. M.

Santa Clara Valley Water District

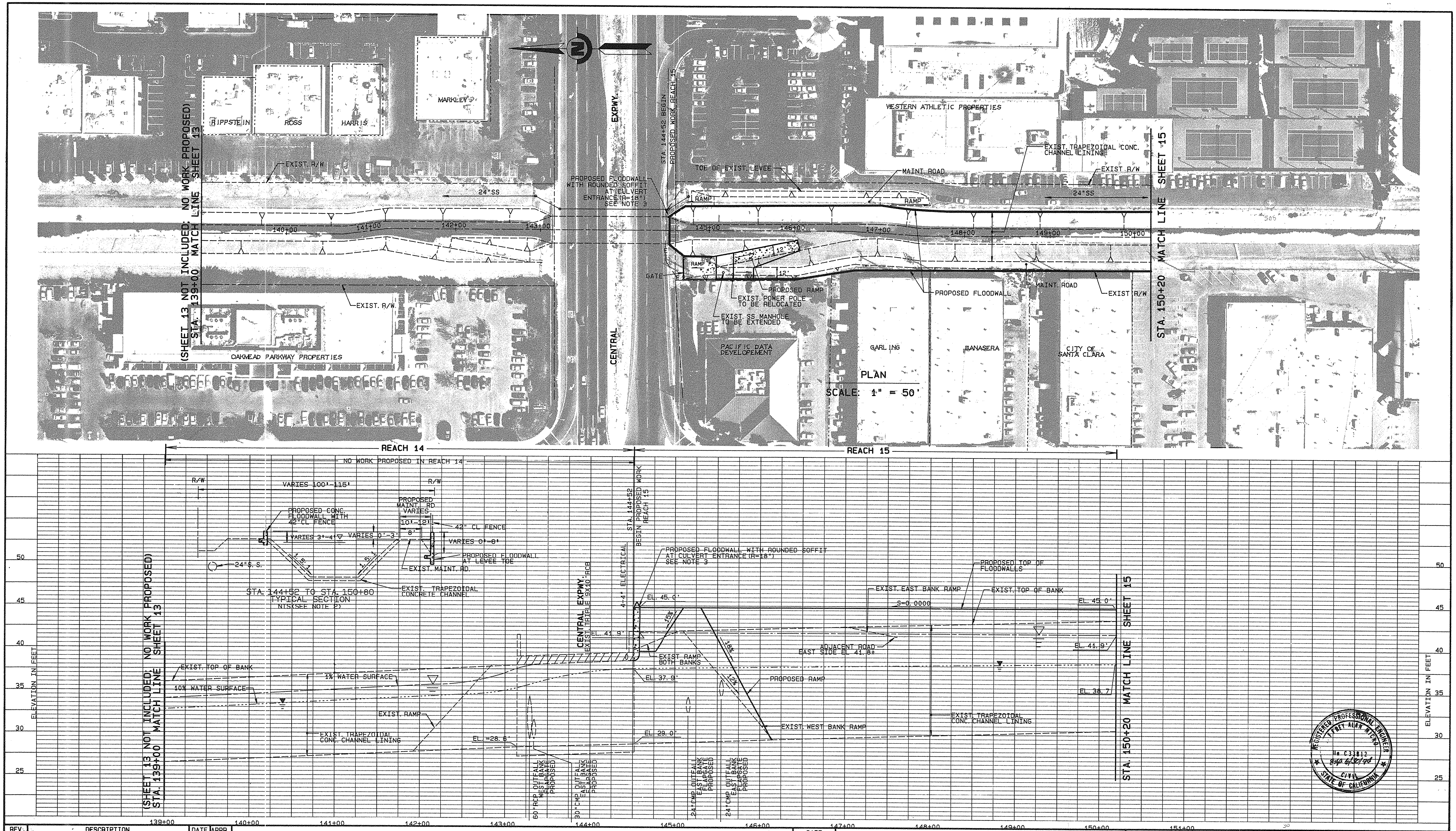
ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'

SHEET
12
OF 35


N
RIPPSTEIN
ROSS
HARRIS
MARKLEY
WESTERN ATHLETIC PROPERTIES
OAKMEAD PARKWAY PROPERTIES
PACIFIC DATA DEVELOPEMENT
GARLING
BANASERA
CITY OF SANTA CLARA
CENTRAL EXPWY
EXIST. R/W
24"SS
TOE OF EXIST. LEVEE
MAINT. ROAD
RAMP
GATE
12'
PROPOSED FLOODWALL WITH ROUNDED SOFFIT AT CULVERT ENTRANCE (R=18") SEE NOTE 3
STA. 144+52 BEGIN PROPOSED WORK REACH 15
EXIST. TRAPEZOIDAL CONC. CHANNEL LINING
PROPOSED RAMP
EXIST. POWER POLE TO BE RELOCATED
EXIST. SS MANHOLE TO BE EXTENDED
PROPOSED FLOODWALL
EXIST R/W
140+00
141+00
142+00
143+00
145+00
146+00
147+00
148+00
149+00
150+00
(SHEET 13 NOT INCLUDED; NO WORK PROPOSED) STA. 139+00 MATCH LINE SHEET 13
STA. 150+20 MATCH LINE SHEET 15
PLAN
SCALE: 1" = 50'
REACH 14
REACH 15
NO WORK PROPOSED IN REACH 14
R/W
VARIES 100'-115'
PROPOSED CONC. FLOODWALL WITH 42"CL FENCE
VARIES 3'-4'
VARIES 0'-3'
PROPOSED MAINT. RD VARIES
10'-12'
8'
42" CL FENCE
VARIES 0'-8'
PROPOSED FLOODWALL AT LEVEE TOE
EXIST. MAINT. RD.
1.5:1
24"S.S.
EXIST. TRAPEZOIDAL CONCRETE CHANNEL
STA. 144+52 TO STA. 150+80 TYPICAL SECTION
NTS(SEE NOTE 2)
CENTRAL EXPWY. EXIST. TRIPLE 9X10' RCB
4-4" ELECTRICAL
EL. 45.0'
EL. 41.9'
EL. 37.9'
EL. 28.0'
EL. 28.6'
EL. 38.7
15%
18%
12%
EXIST RAMP BOTH BANKS
ADJACENT ROAD EAST SIDE EL 41.8±
PROPOSED RAMP
EXIST. WEST BANK RAMP
EXIST. EAST BANK RAMP
S=0.0000
PROPOSED TOP OF FLOODWALLS
EXIST. TOP OF BANK
EXIST. TRAPEZOIDAL CONC. CHANNEL LINING
1% WATER SURFACE
10% WATER SURFACE
EXIST. RAMP
60"RCP OUTFALL WEST BANK FLAPGATE PROPOSED
30"CMP OUTFALL EAST BANK FLAPGATE PROPOSED
24"CMP OUTFALL EAST BANK FLAPGATE PROPOSED
24"CMP OUTFALL EAST BANK FLAPGATE PROPOSED
ELEVATION IN FEET
50
45
40
35
30
25
139+00
144+00
151+00

No. C33812
Exp 6/30/94

REV.	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

1. 1% FLOWRATE 3900 CFS, 10% FLOWRATE 2535 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
3. PROPOSED FLOODWALLS TO BE ARCHITECTURALLY TREATED.
4. SEDIMENT DEPTH AND STAGE MARKERS TO BE ADDED ON WINGWALLS UPSTREAM AND DOWNSTREAM OF CENTRAL EXPRESSWAY.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE
DATE:
RECTIFICATION BY:

DATE 10/9/90
DESIGN KR/JM
DRAWN CAM
CHECKED J. M.

Santa Clara Valley Water District

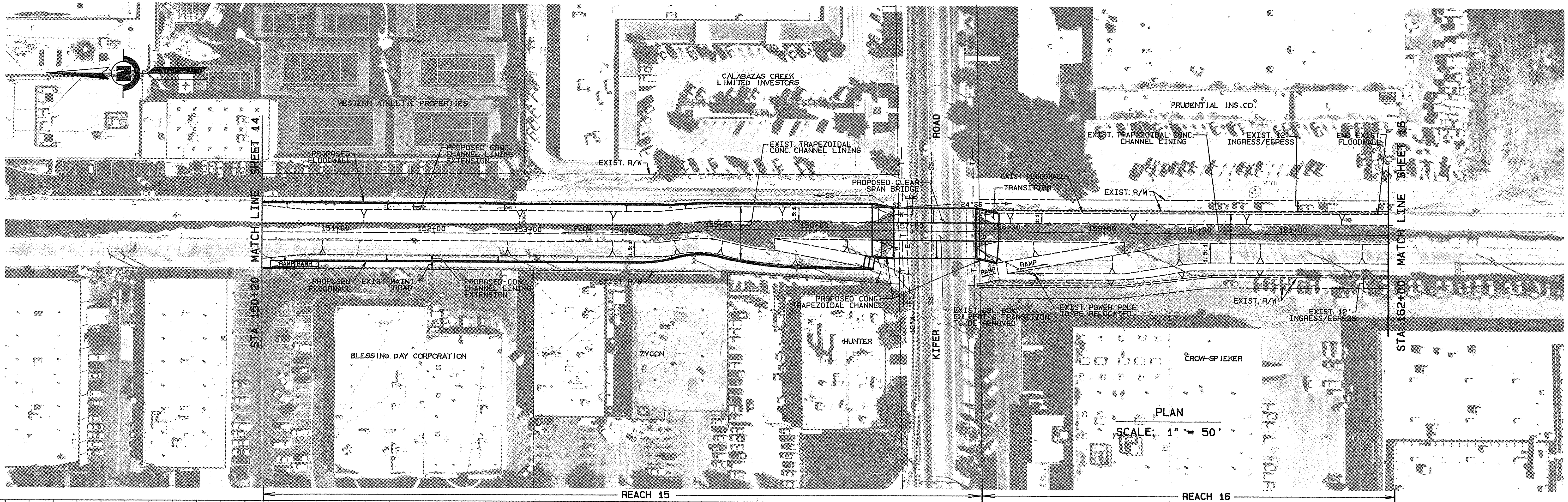
ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

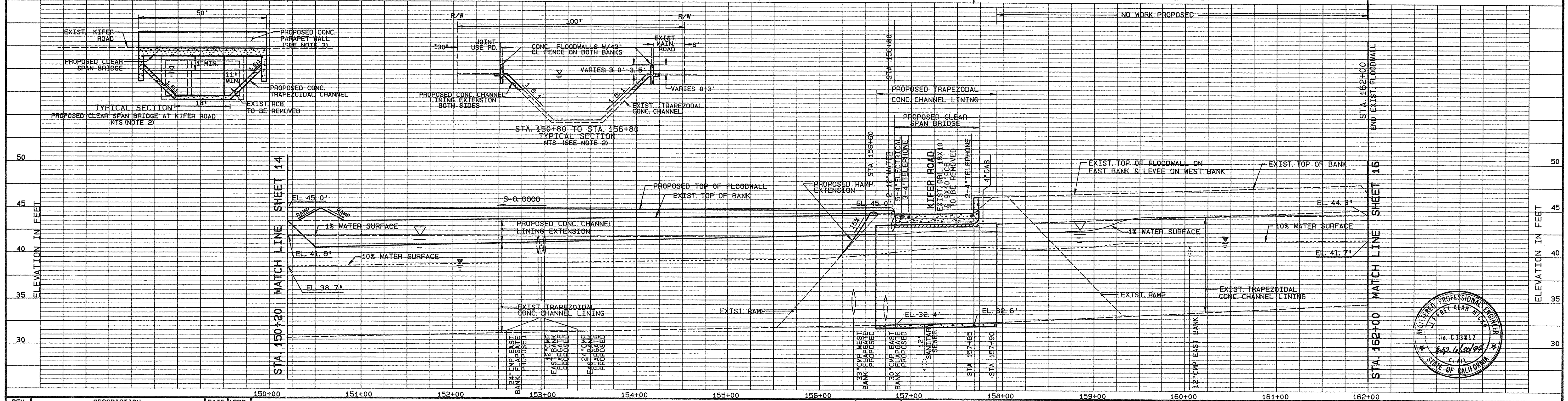
ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'

SHEET
14
OF 35


N
WESTERN ATHLETIC PROPERTIES
CALABAZAS CREEK LIMITED INVESTORS
PRUDENTIAL INS.CO.
BLESSING DAY CORPORATION
ZYCON
HUNTER
CROW-SPIEKER
KIFER ROAD
MATCH LINE SHEET 14
STA. 150+20
MATCH LINE SHEET 16
STA. 162+00
PROPOSED FLOODWALL
PROPOSED CONC. CHANNEL LINING EXTENSION
EXIST. R/W
EXIST. TRAPEZOIDAL CONC. CHANNEL LINING
PROPOSED CLEAR SPAN BRIDGE
EXIST. FLOODWALL TRANSITION
EXIST. TRAPEZOIDAL CONC. CHANNEL LINING
EXIST. 12' INGRESS/EGRESS
END EXIST. FLOODWALL
PROPOSED FLOODWALL
EXIST. MAINT. ROAD
PROPOSED CONC. CHANNEL LINING EXTENSION
PROPOSED CONC. TRAPEZOIDAL CHANNEL
EXIST. DBL. BOX CULVERT & TRANSITION TO BE REMOVED
EXIST. POWER POLE TO BE RELOCATED
EXIST. 12' INGRESS/EGRESS
RAMP
FLOW
24" SS
12" W
SS
151+00
152+00
153+00
154+00
155+00
156+00
157+00
158+00
159+00
160+00
161+00
PLAN
SCALE: 1" = 50'
REACH 15
REACH 16



REGISTERED PROFESSIONAL ENGINEER
JEFFREY ALAN MICKO
No. C33817
Exp. 6/30/94
CIVIL
STATE OF CALIFORNIA

REV	DESCRIPTION	DATE	APPR.

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

1. 1% FLOWRATE 3,900 CFS, 10% FLOWRATE 2,535 CFS
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
3. PROPOSED FLOODWALLS TO BE ARCHITECTURALLY TREATED.
4. SEDIMENT DEPTH AND STAGE MARKERS TO BE ADDED ON WINGWALLS UPSTREAM AND DOWNSTREAM OF KIFER ROAD.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE
DATE:
RECTIFICATION BY:

DATE
10/9/90
DESIGN
KR
DRAWN
CAM
CHECKED
J. M.

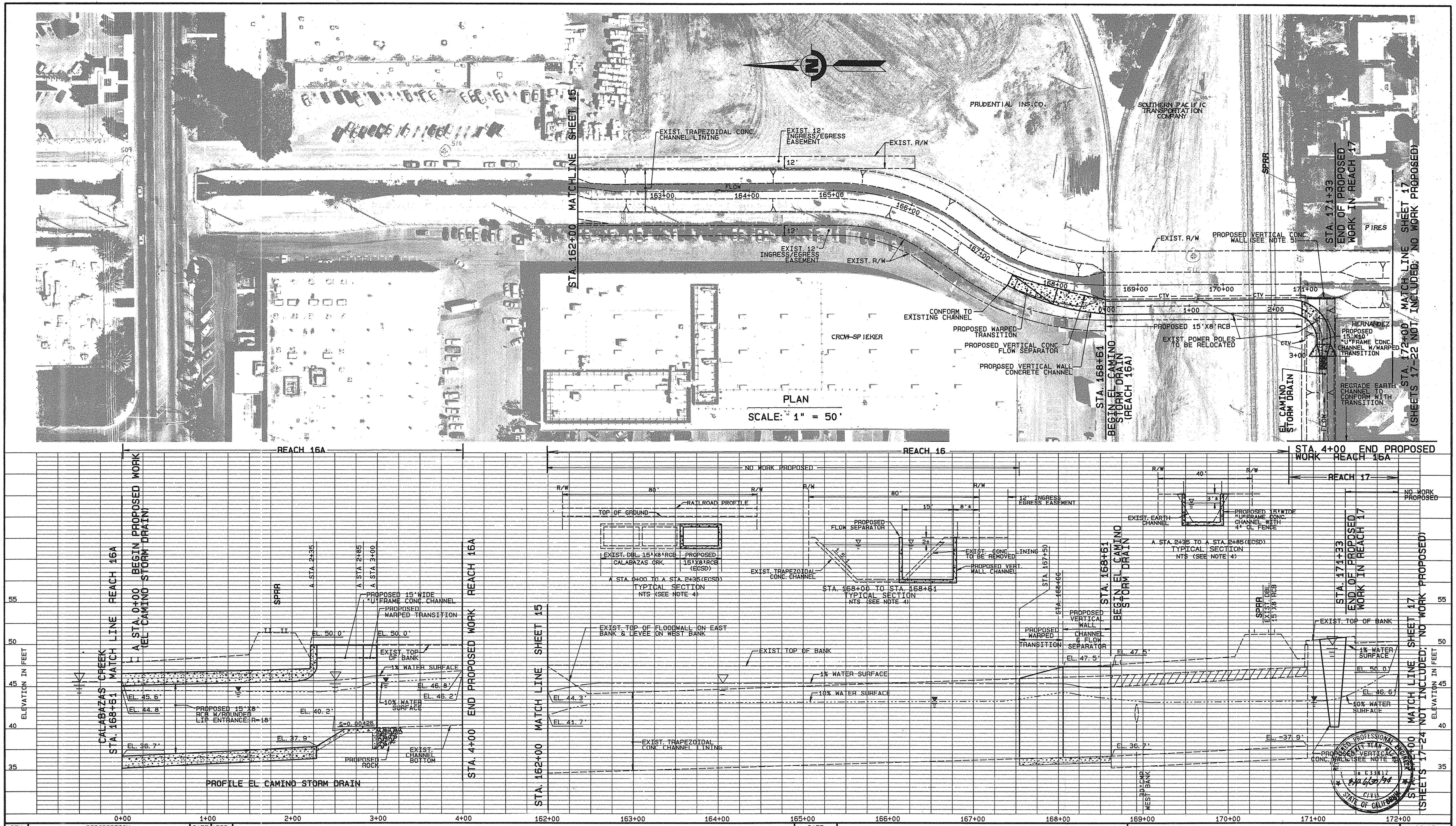
Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'
SHEET
15
OF 35


N
PRUDENTIAL INS.CO.
SOUTHERN PACIFIC TRANSPORTATION COMPANY
CROW-SPIEKER
PIRES
HERNANDEZ
SPRR
STA. 162+00 MATCHLINE SHEET 15
EXIST. TRAPEZOIDAL CONC. CHANNEL LINING
EXIST. 12' INGRESS/EGRESS EASEMENT
EXIST. R/W
12'
FLOW
163+00
164+00
165+00
166+00
167+00
168+00
169+00
170+00
171+00
CONFORM TO EXISTING CHANNEL
PROPOSED WARPED TRANSITION
PROPOSED VERTICAL CONC. FLOW SEPARATOR
PROPOSED VERTICAL WALL CONCRETE CHANNEL
PROPOSED VERTICAL CONC. WALL (SEE NOTE 5)
PROPOSED 15'X8' RCB
EXIST. POWER POLES TO BE RELOCATED
CTV
0+00
1+00
2+00
3+00
PROPOSED 15'X10' "U"FRAME CONC. CHANNEL W/WARPED TRANSITION
REGRADE EARTH CHANNEL TO CONFORM WITH TRANSITION
EL CAMINO STORM DRAIN
BEGIN EL CAMINO STORM DRAIN (REACH 16A)
STA. 168+61
STA. 171+33 END OF PROPOSED WORK IN REACH 17
STA. 172+00 MATCH LINE SHEET 17 (SHEETS 17-22 NOT INCLUDED, NO WORK PROPOSED)
PLAN
SCALE: 1" = 50'
REACH 16A
REACH 16
NO WORK PROPOSED
STA. 4+00 END PROPOSED WORK REACH 16A
REACH 17
NO WORK PROPOSED
CALABAZAS CREEK MATCH LINE REACH 16A STA. 168+61
A STA. 0+00 BEGIN PROPOSED WORK (EL CAMINO STORM DRAIN)
SPRR
A STA. 2+35
A STA. 2+85
A STA. 3+00
PROPOSED 15'WIDE "U"FRAME CONC. CHANNEL
PROPOSED WARPED TRANSITION
EL. 50.0'
EL. 50.0'
EXIST. TOP OF BANK
1% WATER SURFACE
EL. 46.8'
EL. 46.2'
10% WATER SURFACE
EL. 45.6'
EL. 44.8'
PROPOSED 15'X8' RCB W/ROUNDED LIP ENTRANCE: R=18"
EL. 40.2'
S=0.00426
EL. 37.9'
EL. 36.7'
PROPOSED ROCK
EXIST. CHANNEL BOTTOM
PROFILE EL CAMINO STORM DRAIN
STA. 4+00 END PROPOSED WORK REACH 16A
STA. 162+00 MATCH LINE SHEET 15
R/W
80'
RAILROAD PROFILE
TOP OF GROUND
EXIST. DBL. 15'X8'RCB CALABAZAS CRK.
PROPOSED 15'X8'RCB (ECSD)
A STA. 0+00 TO A STA. 2+35(ECSD) TYPICAL SECTION NTS (SEE NOTE 4)
R/W
80'
15'
8'±
PROPOSED FLOW SEPARATOR
2'±
1.5:1
EXIST. TRAPEZOIDAL CONC. CHANNEL
EXIST. CONC. LINING TO BE REMOVED
PROPOSED VERT. WALL CHANNEL
STA. 168+00 TO STA. 168+61 TYPICAL SECTION NTS (SEE NOTE 4)
12' INGRESS EGRESS EASEMENT
EXIST. TOP OF FLOODWALL ON EAST BANK & LEVEE ON WEST BANK
EXIST. TOP OF BANK
1% WATER SURFACE
10% WATER SURFACE
EL. 44.3'
EL. 41.7'
EXIST. TRAPEZOIDAL CONC. CHANNEL LINING
STA. 167+50
STA. 168+00
PROPOSED WARPED TRANSITION
PROPOSED VERTICAL WALL CHANNEL & FLOW SEPARATOR
EL. 47.5'
EL. 47.5'
EL. 36.7'
STA. 168+61 BEGIN EL CAMINO STORM DRAIN
30" CMP WEST BANK
R/W
40'
3'±
EXIST. EARTH CHANNEL
PROPOSED 15'WIDE "U"FRAME CONC. CHANNEL WITH 4' CL FENCE
A STA. 2+35 TO A STA. 2+85(ECSD) TYPICAL SECTION NTS (SEE NOTE 4)
SPRR EXIST. DBL. 15'X8' RCB
EXIST. TOP OF BANK
1% WATER SURFACE
EL. 50.0'
EL. 46.6'
10% WATER SURFACE
EL. 37.9'
PROPOSED VERTICAL CONC. WALL (SEE NOTE 5)
STA. 171+33 END OF PROPOSED WORK IN REACH 17
STA. 172+00 MATCH LINE SHEET 17 (SHEETS 17-24 NOT INCLUDED, NO WORK PROPOSED)
ELEVATION IN FEET
55
50
45
40
35
0+00
1+00
2+00
3+00
4+00
162+00
163+00
164+00
165+00
166+00
167+00
168+00
169+00
170+00
171+00
172+00

STATE OF CALIFORNIA CIVIL No. C33812 Exp. 6/30/94

REV	DESCRIPTION	DATE	APPR.

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

1. REACH 16A 1% FLOWRATE 660 CFS. 10% FLOWRATE 520 CFS.
2. REACH 16 1% FLOWRATE 3900 CFS. 10% FLOWRATE 2535 CFS.
3. REACH 17 1% FLOWRATE 3300 CFS. 10% FLOWRATE 2145 CFS.
4. TYPICAL SECTIONS LOOKING UPSTREAM.
5. PROPOSED VERTICAL CONC. WALL AT ABANDONED EXIST. EL CAMINO STORM DRAIN CONFLUENCE.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE
DATE:
RECTIFICATION BY:

DATE JAN 91
DESIGN KR
DRAWN CAM
CHECKED J. M.

Santa Clara Valley Water District

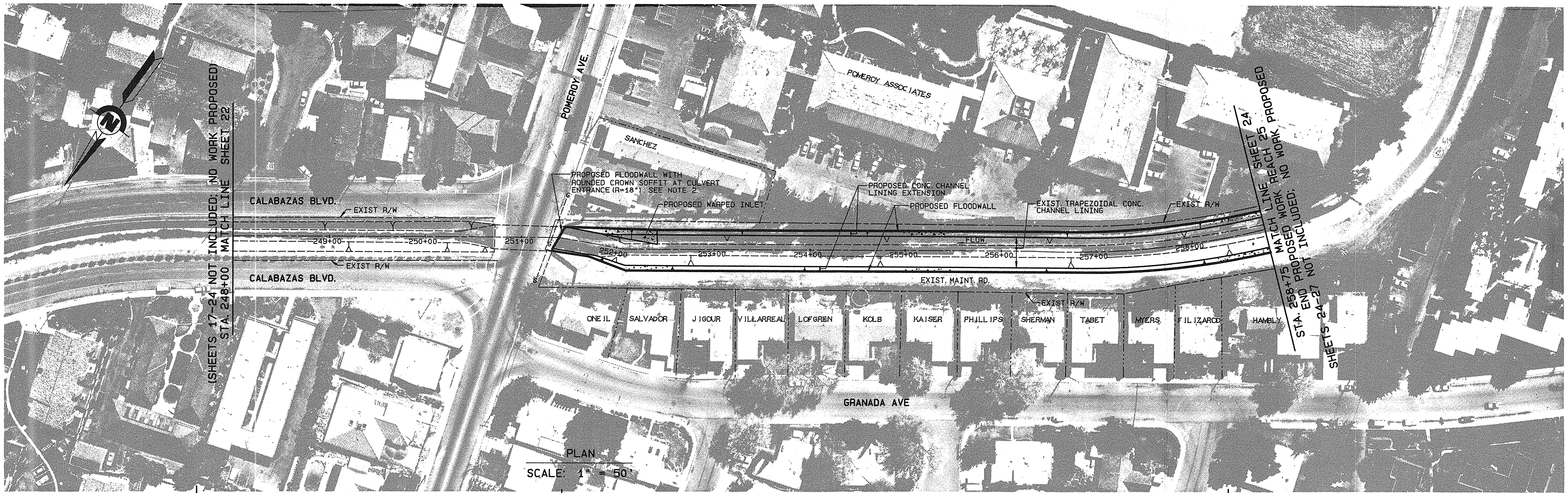
ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

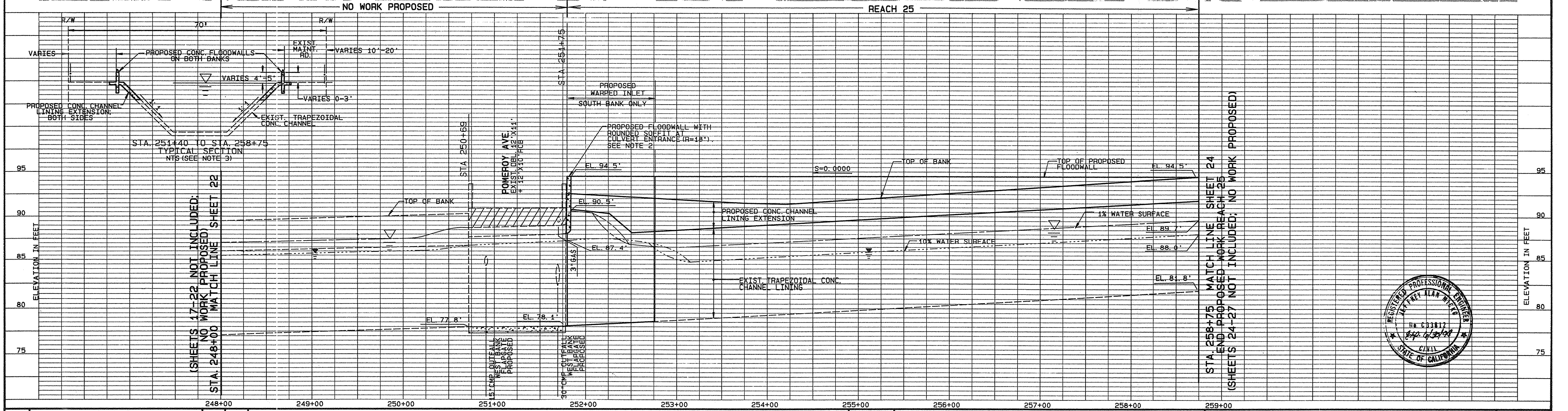
ENGINEERING APPROVAL
S. N. Wolfe
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'

SHEET
16
OF 35


POMEROY AVE.
POMEROY ASSOCIATES
SANCHEZ
PROPOSED FLOODWALL WITH ROUNDED CROWN SOFFIT AT CULVERT ENTRANCE (R=18"). SEE NOTE 2.
PROPOSED WARPED INLET
PROPOSED CONC. CHANNEL LINING EXTENSION
PROPOSED FLOODWALL
EXIST. TRAPEZOIDAL CONC. CHANNEL LINING
EXIST R/W
CALABAZAS BLVD.
249+00
250+00
251+00
252+00
253+00
254+00
255+00
256+00
257+00
258+00
FLOW
EXIST. MAINT. RD.
ONEIL
SALVADOR
JIGOUR
VILLARREAL
LOFGREN
KOLB
KAISER
PHILLIPS
SHERMAN
TABET
MYERS
FILIZARDO
HAMBLY
GRANADA AVE
(SHEETS 17-24 NOT INCLUDED; NO WORK PROPOSED) STA. 248+00 MATCH LINE SHEET 22
STA. 258+75 MATCH LINE SHEET 24 END PROPOSED WORK REACH 25 (SHEETS 24-27 NOT INCLUDED; NO WORK PROPOSED)
PLAN
SCALE: 1" = 50'


NO WORK PROPOSED
REACH 25
R/W
70'
R/W
VARIES
PROPOSED CONC. FLOODWALLS ON BOTH BANKS
EXIST. MAINT. RD.
VARIES 10'-20'
VARIES 4'-5'
VARIES 0-3'
1:1
PROPOSED CONC. CHANNEL LINING EXTENSION; BOTH SIDES
EXIST. TRAPEZOIDAL CONC. CHANNEL
STA. 251+40 TO STA. 258+75
TYPICAL SECTION
NTS (SEE NOTE 3)
STA 250+69
POMEROY AVE. EXIST. DBL. 12'X11' + 12'X10' RCB
STA 251+75
PROPOSED WARPED INLET
SOUTH BANK ONLY
PROPOSED FLOODWALL WITH ROUNDED SOFFIT AT CULVERT ENTRANCE (R=18"). SEE NOTE 2
TOP OF BANK
EL. 94.5'
EL. 90.5'
EL. 87.4'
3' GAS
EL. 77.8'
EL. 78.1'
15" CMP OUTFALL WEST BANK FLAPGATE PROPOSED
30" CMP OUTFALL WEST BANK FLAPGATE PROPOSED
S=0.0000
TOP OF BANK
TOP OF PROPOSED FLOODWALL
EL. 94.5'
PROPOSED CONC. CHANNEL LINING EXTENSION
1% WATER SURFACE
EL. 89.7'
10% WATER SURFACE
EL. 88.0'
EXIST. TRAPEZOIDAL CONC. CHANNEL LINING
EL. 81.8'
(SHEETS 17-22 NOT INCLUDED; NO WORK PROPOSED) STA. 248+00 MATCH LINE SHEET 22
STA. 258+75 MATCH LINE SHEET 24 END PROPOSED WORK REACH 25 (SHEETS 24-27 NOT INCLUDED; NO WORK PROPOSED)
ELEVATION IN FEET
95
90
85
80
75
248+00
249+00
250+00
251+00
252+00
253+00
254+00
255+00
256+00
257+00
258+00
259+00

JEFFREY ALAN MICKO
No. C33812
Exp. 6/30/9

REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES

1. 1% FLOWRATE 3100 CFS, 10% FLOWRATE 2015 CFS.
2. PROPOSED FLOODWALL TO BE ARCHITECTURALLY TREATED.
3. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
4. SEDIMENT DEPTH AND STAGE MARKERS TO BE ADDED ON WINGWALLS UPSTREAM AND DOWNSTREAM OF POMEROY AVENUE.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE
DATE:
RECTIFICATION BY:

DATE 10/9/90
DESIGN KR
DRAWN CAM
CHECKED J. M.

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

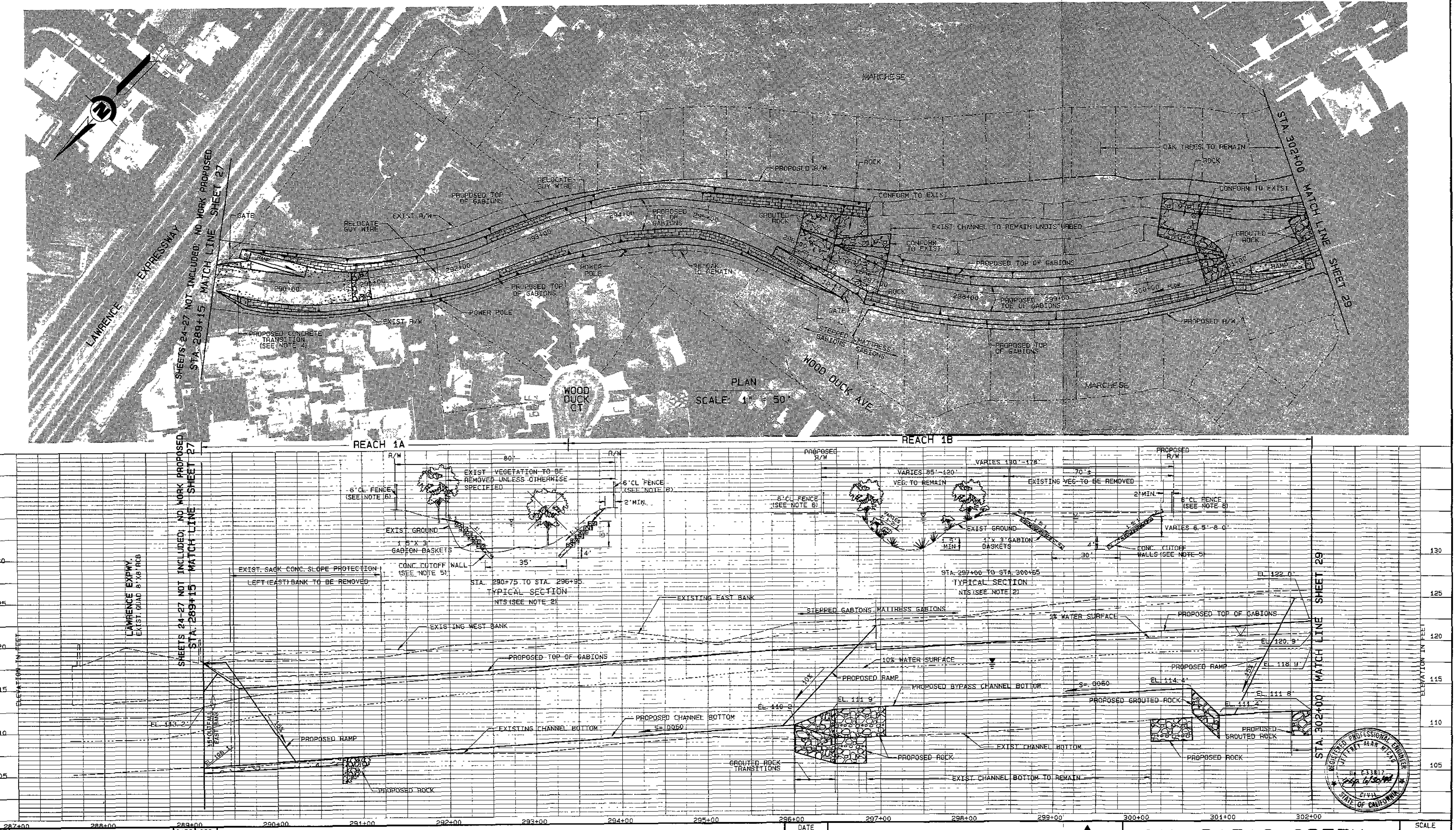
CALABAZAS CREEK

GUADALUPE SLOUGH TO MILLER AVENUE

GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'

SHEET
23
OF 35



DESCRIPTION	DATE	APPR.
REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

1. 1% FLOWRATE 3,000 CFS. 10% FLOWRATE 1,900 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM
3. SEDIMENT DEPTH AND STAGE MARKERS TO BE ADDED ON WINGWALLS UPSTREAM OF LAWRENCE EXPRESSWAY
4. REMOVE EXIST WING WALLS AND CONSTRUCT CONCRETE TRANSITION. FLARE ≤12°.
5. CONSTRUCT CONCRETE CUTOFF WALLS AT SLOPE OF GABION LINING UP TO MAXIMUM SLOPE 1:1
6. 6' CHAIN LINK FENCE TO BE INSTALLED ALONG UNFENCED R/W WITH GATES AT STREET CROSSINGS

PHOTOGRAPHY BY: AIR FLIGHT SERVICE

DATE: 3-29-85

RECTIFICATION BY:

DATE 10/9/90
DESIGN KPR/JAM
DRAWN CAM
CHECKED

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

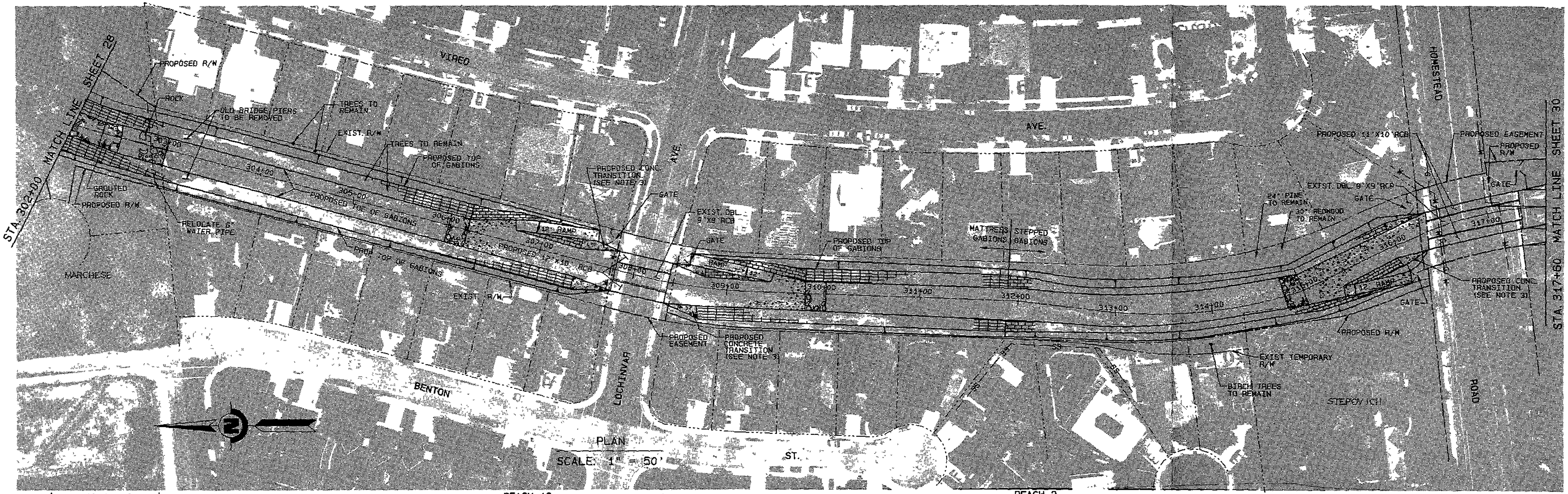
ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

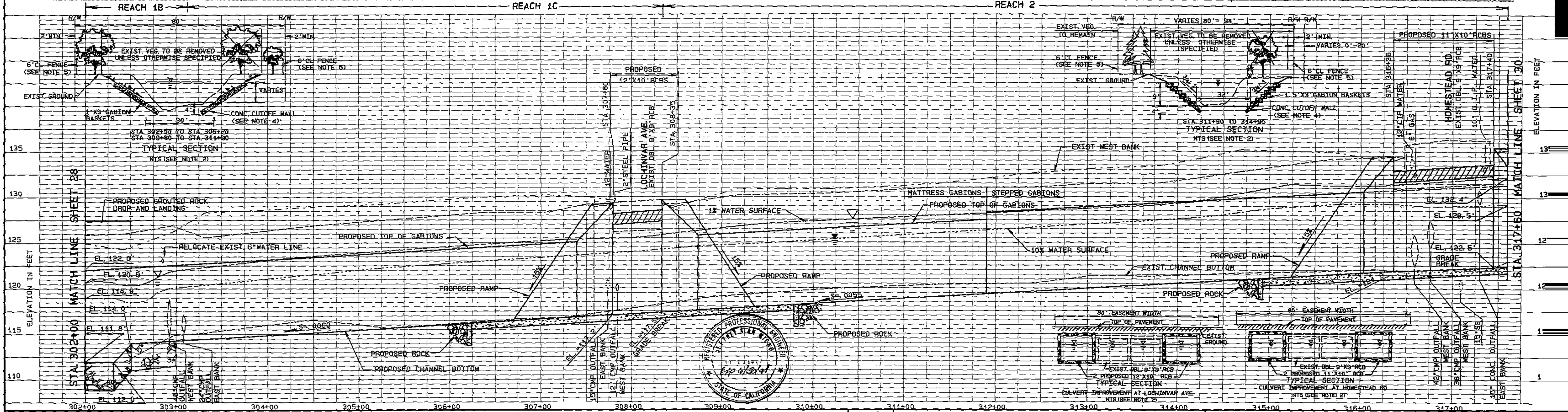
CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE H: 1"=50' V: 1"=5'

SHEET 28 OF 35

Jeffrey Alan Micko
C33812
6/30/98





REGISTERED PROFESSIONAL ENGINEER
EXP 6/30/91
STATE OF CALIFORNIA

REV	DESCRIPTION	DATE	APPR.

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

1. 1% FLOWRATE 3,000 CFS, 10% FLOWRATE 1900 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
3. REMOVE EXIST WING WALLS & CONSTRUCT CONC. TRANSITION. FLARE ∢ ≤ 12°
4. CONSTRUCT CONC. CUTOFF WALLS AT SLOPE OF GABION LINING UP TO MAX. SLOPE 1:1.
5. 6' CHAIN LINK FENCE TO BE INSTALLED ALONG UNFENCED R/W WITH GATES AT STREET CROSSINGS.
6. SEDIMENT DEPTH AND STAGE MARKERS TO BE ADDED ON WINGWALLS UPSTREAM AND DOWNSTREAM OF LOCHINVAR AVE. AND HOMESTEAD ROAD

PHOTOGRAPHY BY [illegible] FLIGHT SERVICE DATE: 3-29-85 RECTIFICATION BY:

DATE	10/9/90
DESIGN	JAM/KPR
DRAWN	CAM
CHECKED	KPR

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Jeff Mick
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
Stan B. Wolfe
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

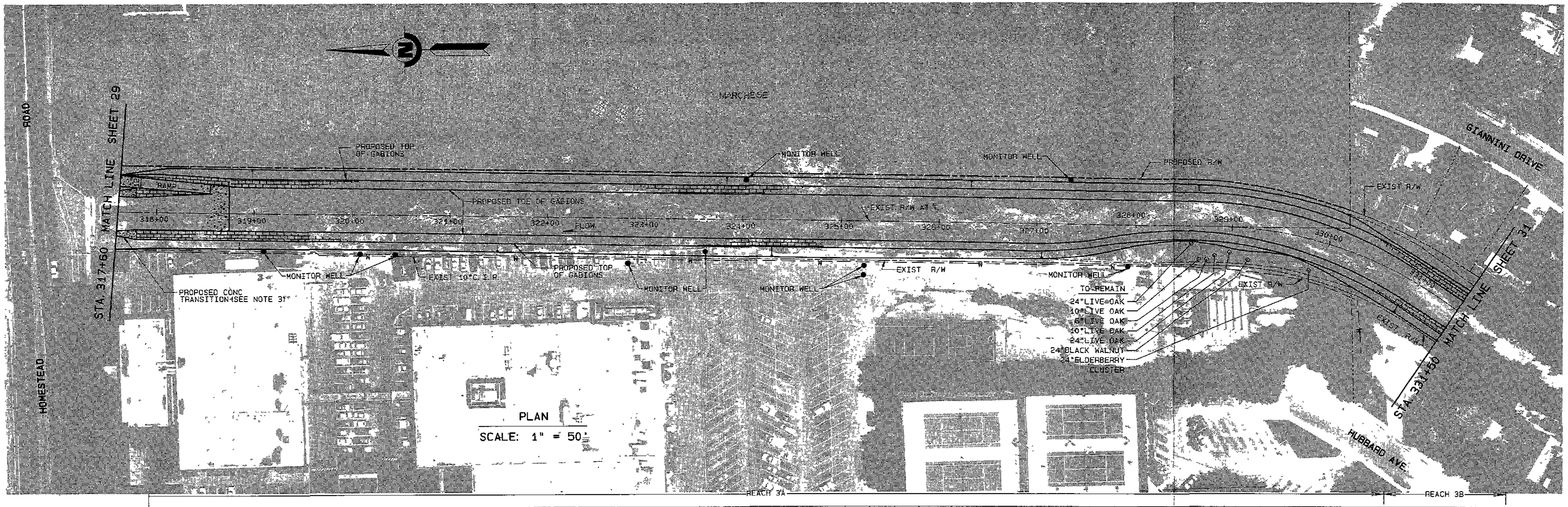
CALABAZAS CREEK

GUADALUPE SLOUGH TO MILLER AVENUE

GENERAL PLAN

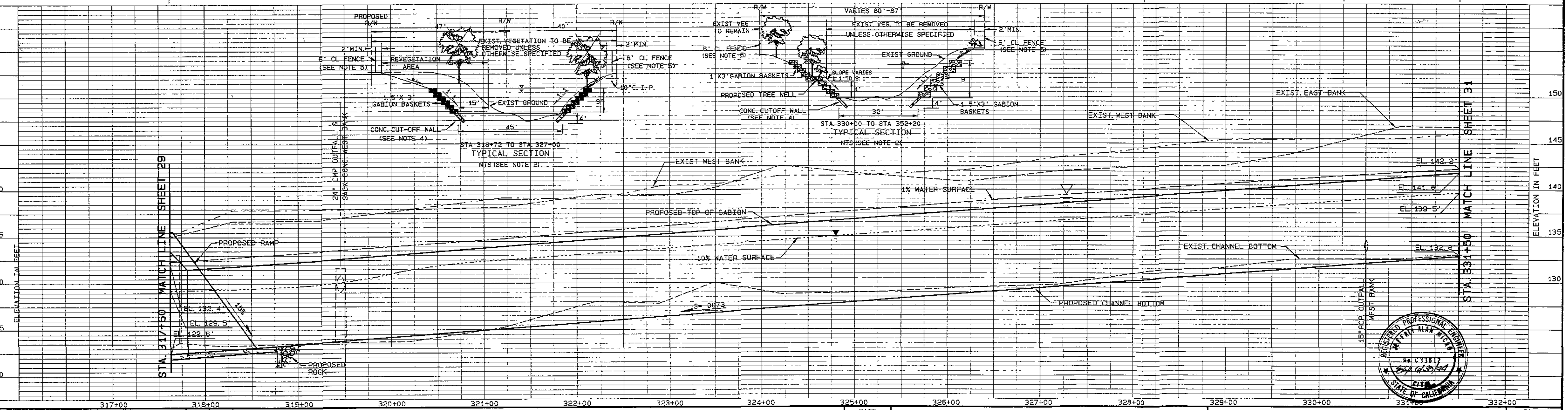
SCALE
H: 1"=5
V: 1"=

SHEET
29
OF 3



PLAN

SCALE: 1" = 50'



JEFFREY ALAN MICKS
No. C33812
Exp 6/30/94

DESCRIPTION	DATE	APPR.
REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES

1 1% FLOWRATE 3,000 CFS. 10% FLOWRATE 1,900 CFS
2 TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
3. REMOVE EXIST WING WALLS AND CONSTRUCT CONC TRANSITION. FLARE ∗ =12°.
4 CONSTRUCT CONC. CUTOFF WALLS AT SLOPE OF GABION LINING UP TO MAX SLOPE 1.5:1.
5 6' CHAIN LINK FENCE TO BE INSTALLED ALONG UNFENCED R/W WITH GATES AT STREET CROSSINGS

PHOTOGRAPHY BY: AIR FLIGHT SERVICE DATE: 3-29-85 RECTIFICATION BY:

DATE
10/9/90
DESIGN
J. M
DRAWN
A1
CHECKED
J M.

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Jeff Micks
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO 20474

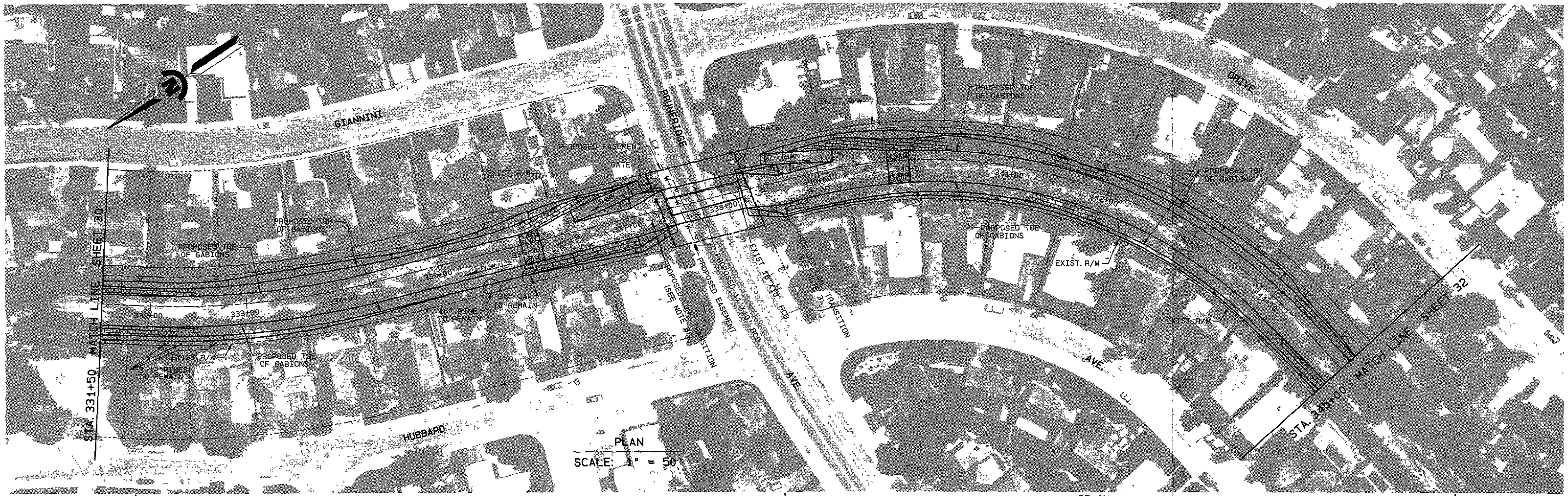
CALABAZAS CREEK

GUADALUPE SLOUGH TO MILLER AVENUE

GENERAL PLAN

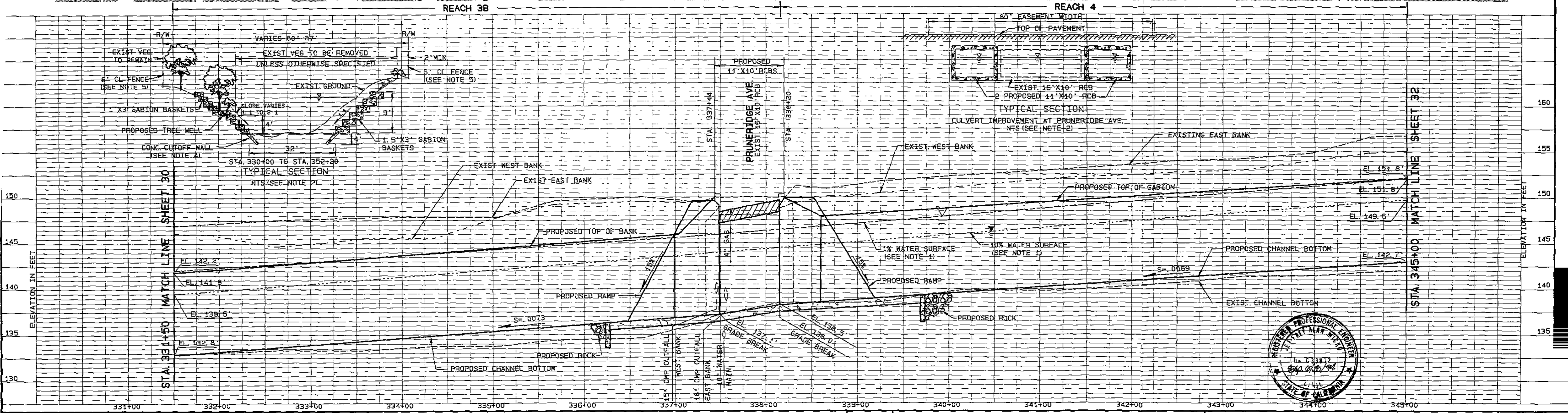
SCALE
H: 1"=50'
V: 1"=5'

SHEET
30
OF 35



PLAN

SCALE: 1" = 50'



Exp 6/30/94

REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES

1. 1% FLOWRATE 3,000 CFS. 10% FLOWRATE 1,900 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM
3. REMOVE EXIST. WING WALLS AND CONSTRUCT CONC. TRANSITION. FLARE ∢ ≤ 12°
4. CONSTRUCT CONC CUTOFF WALLS AT SLOPE OF GABION LINING UP TO MAX. SLOPE 1.1.
5. 6' CHAIN LINK FENCE TO BE INSTALLED ALONG UNFENCED R/W WITH GATES AT STREET CROSSINGS.
6. SEDIMENT DEPTH AND STAGE MARKERS TO BE ADDED ON WINGWALLS UPSTREAM AND DOWNSTREAM OF PRUNERIDGE AVE.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE DATE: 3-29-85 RECTIFICATION BY:

DATE
10/9/90
DESIGN
J. M.
DRAWN
A1
CHECKED
J. M.

Santa Clara Valley Water District

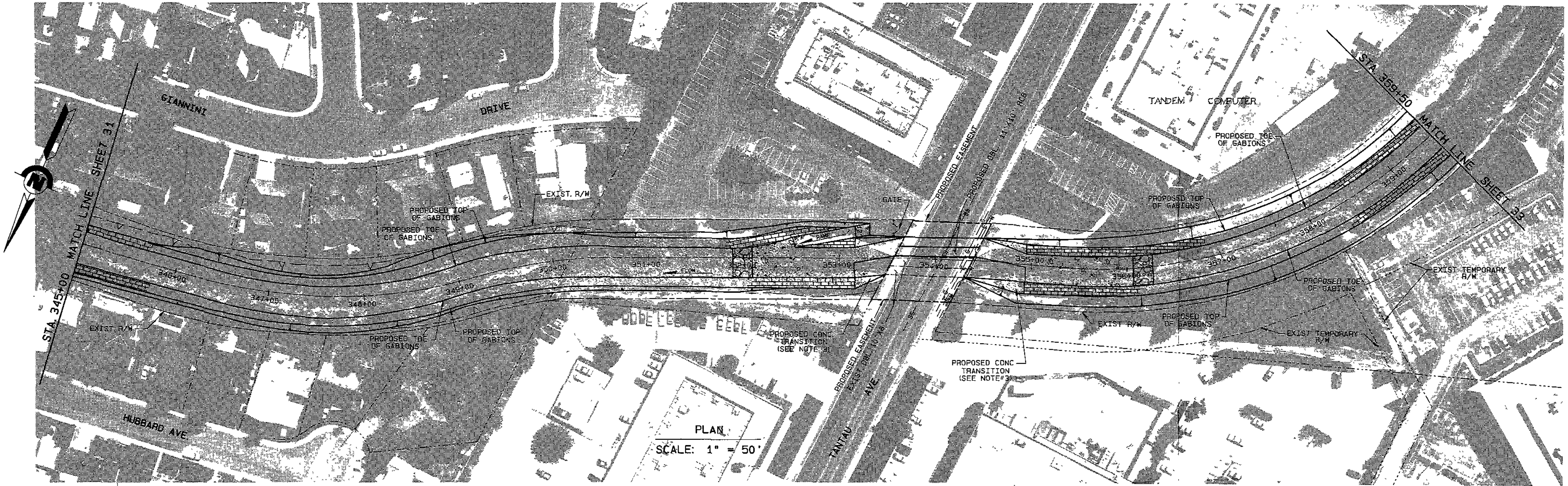
ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

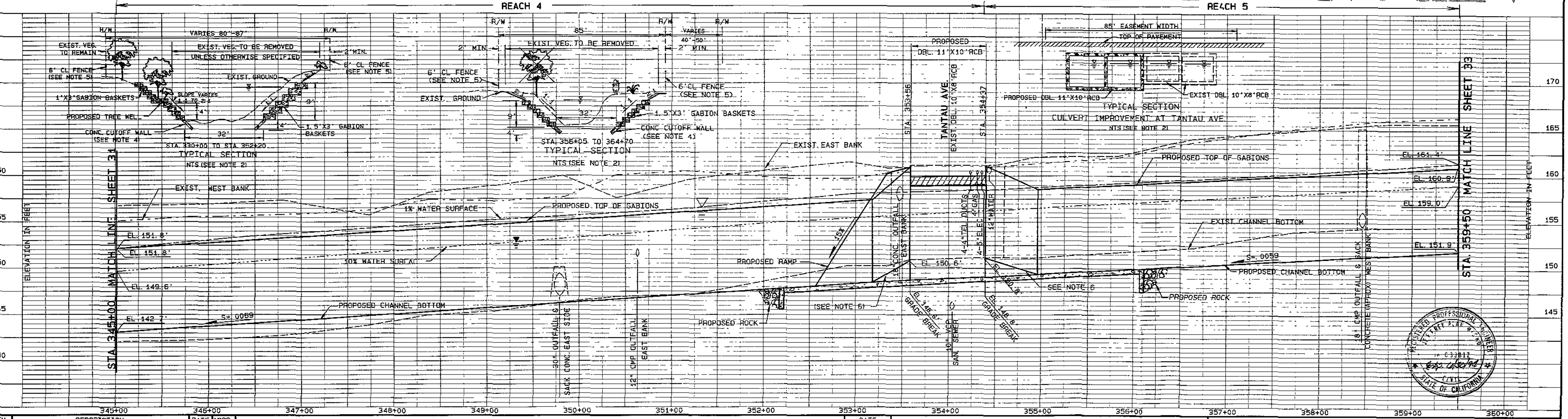
ENGINEERING APPROVAL
Stan N. Walz
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'

SHEET
31
OF 35





REV.	DESCRIPTION	DATE	APPR.

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

1. 1% FLOWRATE 3,000 CFS, 10% FLOWRATE 1,900 CFS
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM
3. REMOVE EXISTING WING WALLS AND CONSTRUCT CONCRETE TRANSITION. FLARE ∢ ≤ 12°
4. CONSTRUCT CONCRETE CUTOFF WALLS AT SLOPE OF GABION LINING UP TO MAXIMUM SLOPE 1:1.
5. 6' CHAIN LINK FENCE TO BE INSTALLED ALONG UNFENCED R/W WITH GATES AT STREET CROSSINGS.
6. CONSTRUCT CONCRETE INVERT TRANSITION FROM DESIGN CHANNEL BOTTOM TO EXISTING CULVERT INVERT.
7. SEDIMENT DEPTH AND STAGE MARKERS TO BE ADDED ON WINGWALLS UPSTREAM AND DOWNSTREAM OF TANTAU AVE.

PHOTOGRAPHY BY: *AIR FLIGHT SERVICE* *DATE:* 3-29-85 *RECTIFICATION BY:*

DATE
10/9/90
DESIGN
JM & KR
DRAWN
CAM
CHECKED
J M

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

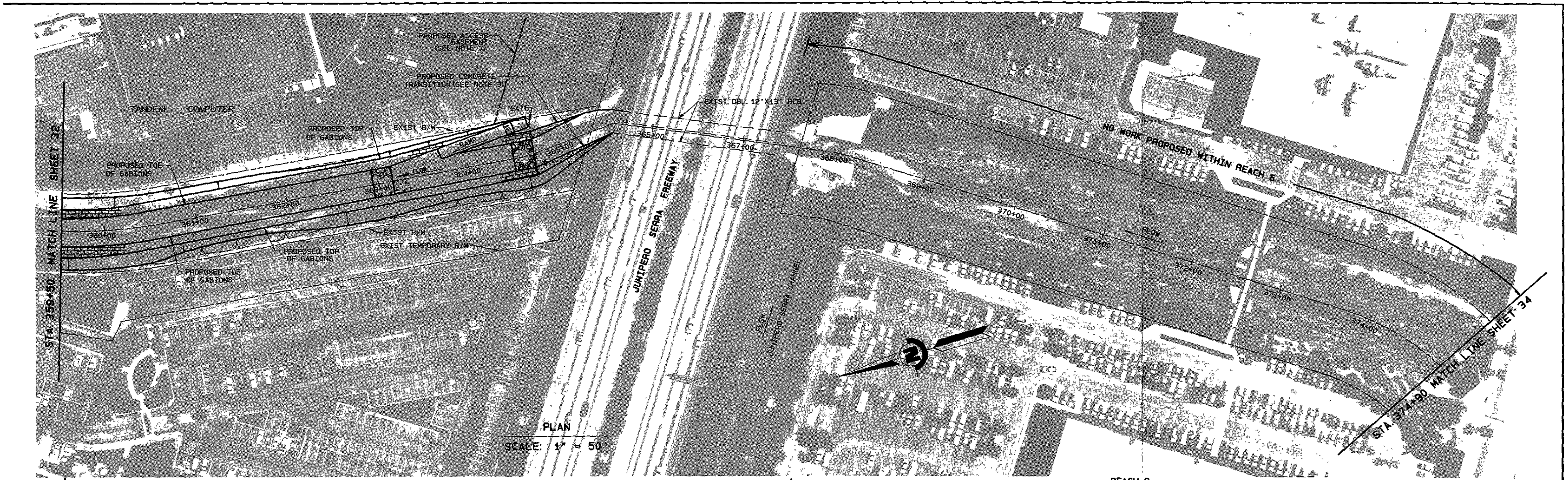
JEFFREY ... C 33812 exp. 12/31/94 CIVIL

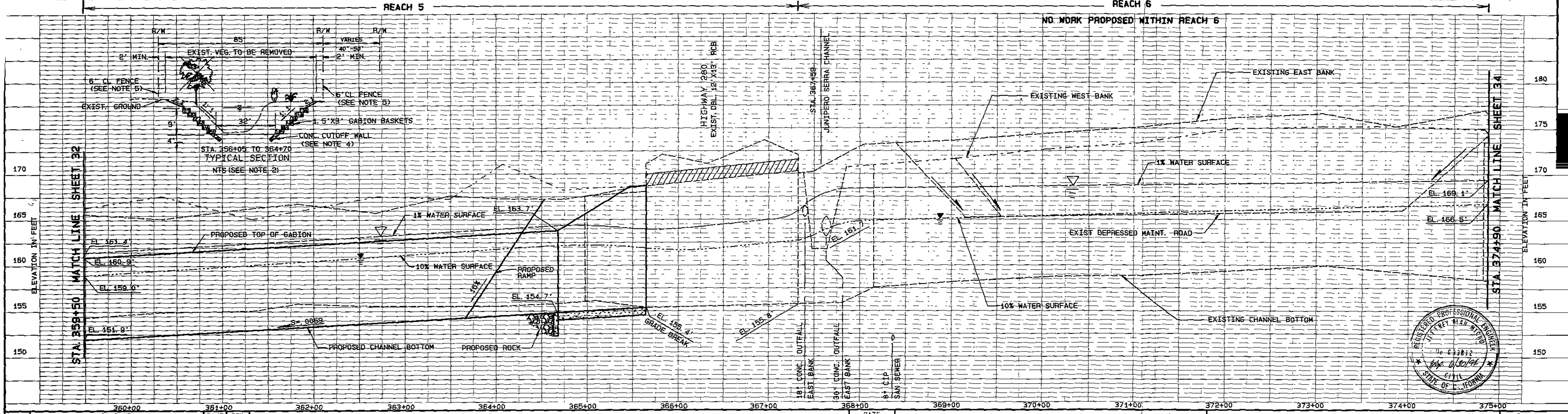
CALABAZAS CREEK

GUADALUPE SLOUGH TO MILLER AVENUE

GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'
SHEET
32
OF 35





REGISTERED PROFESSIONAL ENGINEER
JEFFREY ALAN MICKO
No. C33812
Exp. 6/30/94
CIVIL
STATE OF CALIFORNIA

REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

1. 1% FLOWRATE UPSTREAM JUNIPERO SERRA CHANNEL 2800 CFS.
   1% FLOWRATE DOWNSTREAM JUNIPERO SERRA CHANNEL 3000 CFS.
   10% FLOWRATE UPSTREAM JUNIPERO SERRA CHANNEL 1770 CFS.
   10% FLOWRATE DOWNSTREAM JUNIPERO SERRA CHANNEL 1900 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
3. REMOVE EXISTING WING WALLS, EXTEND EAST CULVERT WALL AND CONSTRUCT CONCRETE TRANSITION. FLARE ≮ ≤ 12°
4. CONSTRUCT CONC. CUTOFF WALLS AT SLOPE OF GABION LINING UP TO MAXIMUM SLOPE 1:1.
5. 6' CHAIN LINK FENCE TO BE INSTALLED ALONG UNFENCED R/W WITH GATES AT STREET CROSSINGS.
6. SEDIMENT AND DEPTH STAGE MARKERS TO BE ADDED ON WINGWALLS UPSTREAM AND DOWNSTREAM OF JUNIPERO SERRA FREEWAY.
7. ACCESS EASEMENT FROM TANTAU AVE. TO RAMP TO BE ACQUIRED FROM TANDEM COMPUTER COMPANY.

PHOTOGRAPHY BY [illegible] SERVICE DATE: 3-29-85 RECTIFICATION BY.

DATE 10/9/90
DESIGN JM & KR
DRAWN AL/CAM
CHECKED J M.

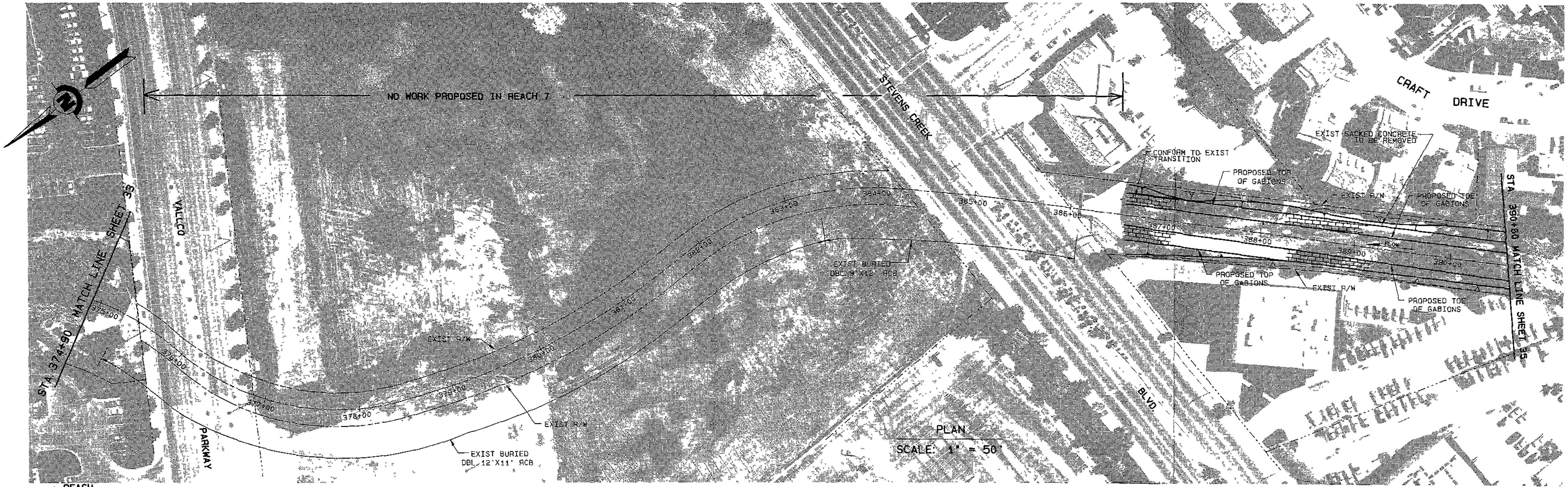
Santa Clara Valley Water District

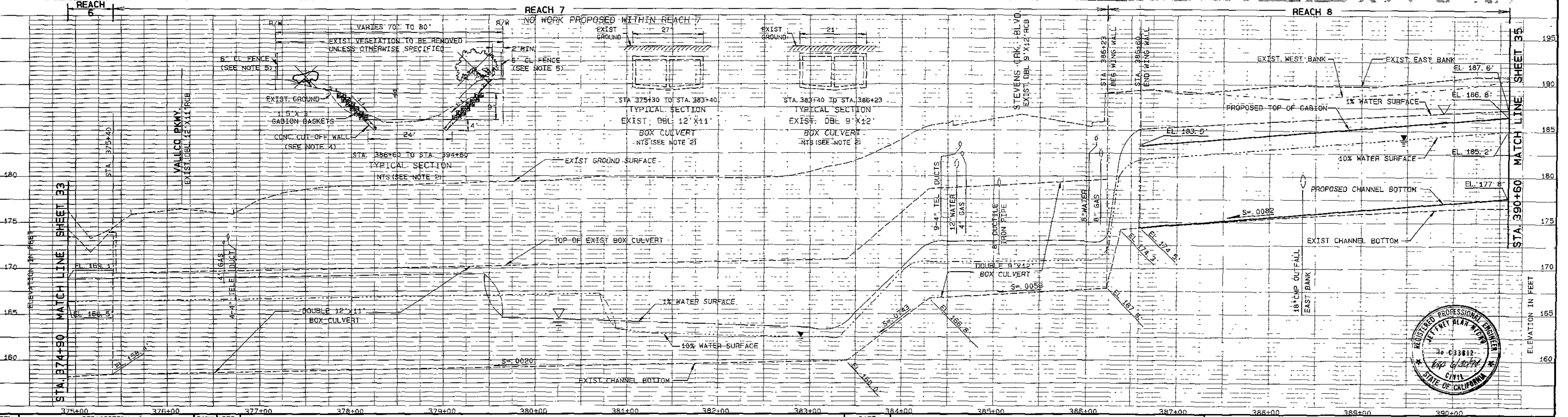
ENGINEERING CERTIFICATION
Jeff Mick
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'
SHEET
33
OF 35





JEFFREY ALAN MICKO
No C33812
Exp 6/30/94

REV.	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

1 1% FLOWRATE 2,800 CFS. 10% FLOWRATE 1,770 CFS.
2 TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
3. SEDIMENT AND DEPTH STAGE MARKERS TO BE ADDED ON WINGWALL UPSTREAM OF STEVENS CREEK BLVD
4 CONSTRUCT CONC CUTOFF WALLS AT SLOPE OF GABION LINING UP TO MAX SLOPE 1:1
5 6' CHAIN LINK FENCE TO BE INSTALLED ALONG UNFENCED R/W WITH GATES AT STREET CROSSINGS

PHOTOGRAPHY BY: AIR FLIGHT SERVICE DATE: 3-29-85 RECTIFICATION BY:

DATE 10/ 9/89
DESIGN JM & KR
DRAWN A1/CAM
CHECKED J. M

Santa Clara Valley Water District

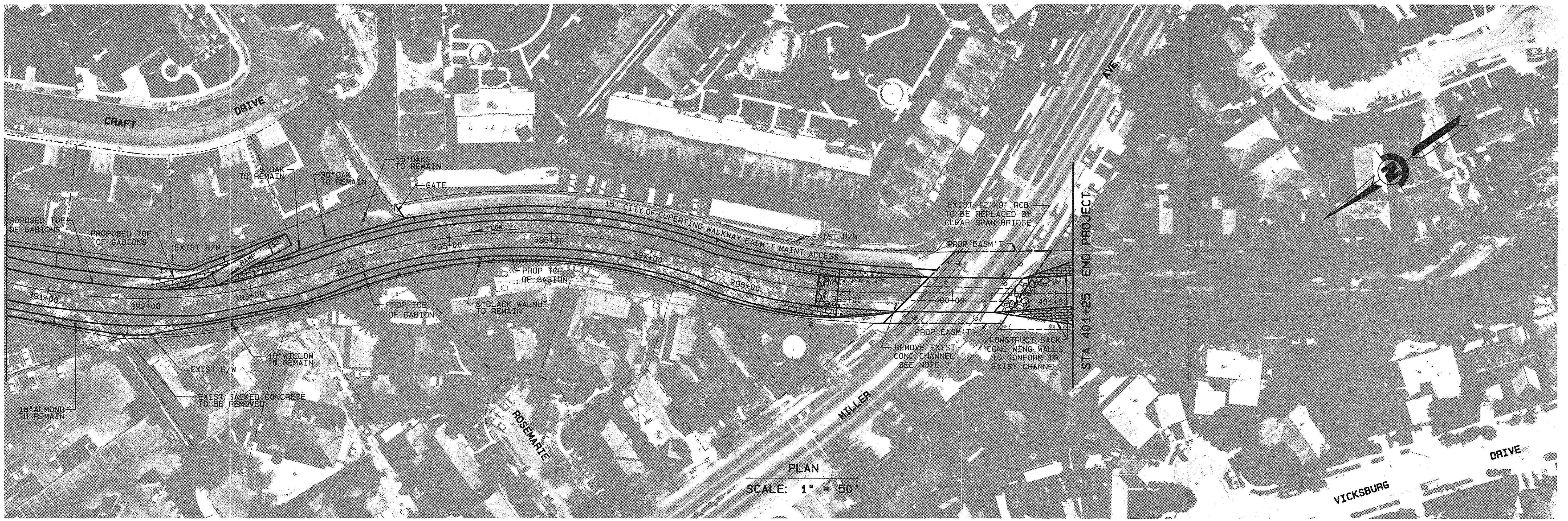
ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO 25093

ENGINEERING APPROVAL
Stan N. Wolfe
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

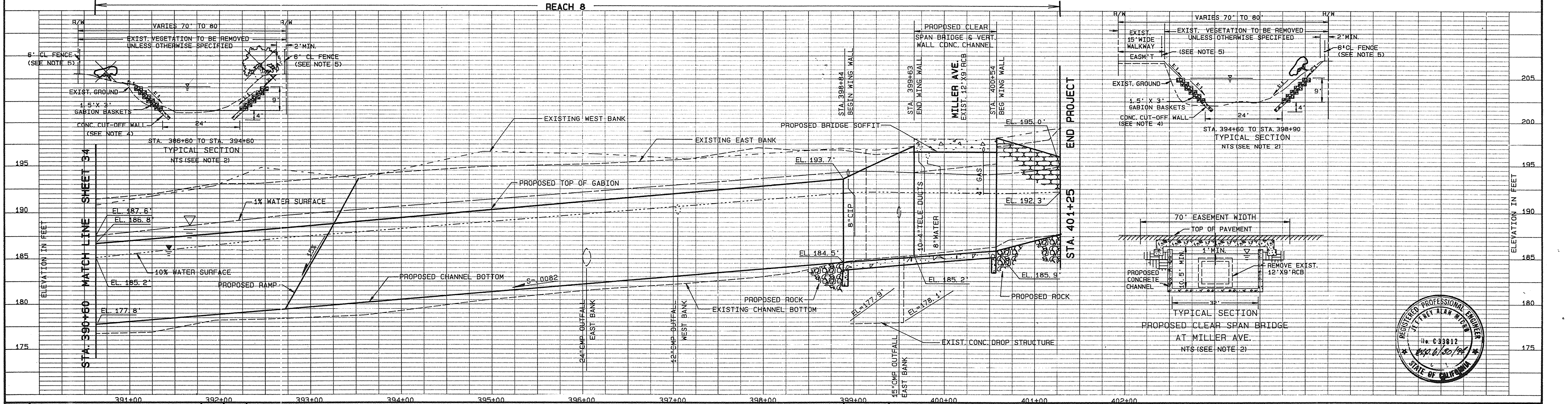
CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'

SHEET
34
OF 35



PLAN
SCALE: 1" = 50'



JEFFREY ALAN MICKO
No. C33812
Exp. 6/30/94

REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

1. 1% FLOWRATE 3,000 CFS, 10% FLOWRATE 1,770 CFS.
2. TYPICAL SECTIONS DRAWN LOOKING UPSTREAM.
3. REMOVE EXIST. CONC. WALLS AND CONSTRUCT CONC. TRANSITION. FLARE ∢ ≤ 12°
4. CONSTRUCT CONC. CUTOFF WALLS AT SLOPE OF GABION. LINING UP TO MAX. SLOPE 1.5:1.
5. 6' CHAIN LINK FENCE TO BE INSTALLED ALONG UNFENCED R/W WITH GATES AT STREET CROSSINGS.
6. SEDIMENT AND DEPTH STAGE MARKERS TO BE ADDED ON WINGWALL DOWNSTREAM OF MILLER AVE.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE
DATE: 3-29-85
RECTIFICATION BY:

DATE
10/ 9/89
DESIGN
JM & KR
DRAWN
A1/CAM
CHECKED
J. M.

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Jeff Micko
PROJECT ENGINEER R.C.E. NO. 33812
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

CALABAZAS CREEK
GUADALUPE SLOUGH TO MILLER AVENUE
GENERAL PLAN

SCALE
H: 1"=50'
V: 1"=5'
SHEET
35
OF 35

APPENDICES

APPENDIX A

LIST OF TECHNICAL TERMS

Ad Valorem Tax: A tax based on property value.

Amortization: The process of liquidating a debt by installment payments or payment into a sinking fund; to prorate over a defined period at a specified interest rate.

Benefit Assessment: Revenues that supplement other available but limited revenues sufficiently to keep the existing flood protection system in a safe and effective condition, to perform maintenance and repair, to provide for needed new flood control construction, and in general to provide all flood control services to the public. The assessments are levied in proportion to benefits received, that is, on the basis of proportionate stormwater runoff from each parcel. The assessment per single family residence is uniform zonewide ($13.80 per year in FY 1990-91).

Confluence: The junction of two streams.

Cubic Foot Per Second (cfs): A rate of flow equivalent to 1 cubic foot, about 7½ gallons, passing a point during 1 second (approximately 450 gallons/minute).

dBA: Decibel, a unit for measuring the volume of a sound.

Design Flow: The magnitude of streamflow that is used in design of channel modifications and structures across channels.

Freeboard: Vertical distance between the top of an embankment adjoining a channel and the water level in the channel. It is a factor of safety designed into a project.

Floodwaters: Those flows of water that cannot be contained within the natural stream channel.

Floodplain: A wide, gently sloping area subject to periodic flooding.

Gabion: A wire mesh rectangular basket filled with uniformly sized rocks.

Levees: Earth embankments that are constructed to contain flood flows. In this project there are existing levees (part of the existing creek) and proposed levees (part of the proposed flood control project).

One Percent (1%) Flood: The flood that has a 1 percent chance of being equalled or exceeded in any one year. (See Appendix H).

Reach: A subdivision of the creek for convenience of study and reference.

Riparian: Vegetation and wildlife living within and immediately adjacent to a river, stream, or lake. In this report, riparian means the creek environment.

Rock Lining: Also called riprap, this is a measure commonly used to protect against erosion of earth banks or creek bottoms. In this project, most rock-lined areas will also be filled with soil and revegetated.

Roughness Coefficient: Represents the frictional resistance of a surface to the flow of water; used in hydraulic computations.

Watershed: The geographical region or area drained by a stream. Also referred to as a basin.

Wetlands: As used herein, areas that under normal circumstances have hydrophytic vegetation, hydric soils, and wetland hydrology.

APPENDIX B

PERSONS TO CONTACT FOR MORE INFORMATION

About This Report

Randy Talley, Flood Control Planning Division Engineer,
Santa Clara Valley Water District
927-0710

About Flood Insurance

Randy Talley, Flood Control Planning Division Engineer
Santa Clara Valley Water District
927-0710

About Environmental Considerations

Dr. Bernard Goldner, Environmental Specialist
Santa Clara Valley Water District
265-2600

About Creek Maintenance

James D. Cooper, Chief of Facilities Maintenance
Santa Clara Valley Water District
265-2600

About Land Acquisition/Dedication

Vincent Lico, Real Estate Division Head
Santa Clara Valley Water District
265-2600

About Detailed Design and Construction

Iwao Shintani, Flood Control Design Senior Civil Engineer
Santa Clara Valley Water District
927-0710

About Local Storm Drains

Sho Yoshida, Principal Engineer - Design
City of Santa Clara
984-3045

E. M. Yoshizuka, Senior Civil Engineer
City of Sunnyvale
730-7429

Bert Viskovich, Director of Public Works
City of Cupertino
252-4642

APPENDIX C

ORGANIZATIONS AND PERSONS CONTACTED DURING PREPARATION OF THIS REPORT

Mr. Stan Richards
San Francisco Water Department
Millbrae, CA

Mr. Lance Barnes
Tel Sunnyvale Cable
Sunnyvale, CA

Mr. Richard H. Hathorn
Director of Water & Sewer Utilities
City of Santa Clara

Mr. Dean Paterson
Pacific Bell
Redwood City, CA

Mr. Terry McAndrews
Pacific Gas and Electric
San Jose, CA

Mr. John C. Roukema
Assistant Director of Electric Utility
City of Santa Clara

Mr. Lawrence M. Berg
Pacific Gas and Electric Company
Cupertino, CA

Ms. Cay Goude
U. S. Fish & Wildlife Service
Sacramento, CA

Mr. Carl Wilcox
California Department of Fish & Game
Yountville, CA

E. M. Yoshizuka
Senior Civil Engineer
City of Sunnyvale

Mr. Sho Yoshida
Principal Engineer - Design
City of Santa Clara

Mr. Robert Cowan
Director of Planning & Development
City of Cupertino

Mr. Travis Whittan
Public Works Department
City of Cupertino

Mr. Richard Bell
Field Services
City of Sunnyvale

Mr. Morris E. Quanrud
Engineer
California Water Service Company

Mr. Frank Kelleher
U. S. Army Corps of Engineers
San Francisco District

Ms. Joyce Minjiras
U. S. Army Corps of Engineers
Regulatory Branch
San Francisco District

APPENDIX D

CONSISTENCY WITH GOVERNMENTAL AGENCIES PLANS AND POLICIES

A. Federal Plans and Policies

The following discussion addresses the proposed Calabazas Creek Flood Control Project's conformance to relevant federal plans and policies.

Clean Air Act

The purpose of the Clean Air Act (as amended in 1977) is to protect and enhance air quality, as well as to promote the public health and welfare. The U. S. Environmental Protection Agency has established a set of Ambient Air Quality Standards which are primarily implemented by state and local agencies. The proposed flood control project is located in the San Francisco Bay Area Basin which is designated as an Air Quality Maintenance Area. The proposed project would not result in any change in automobile traffic which would be a source of air pollutant emissions. Construction activities associated with the project would generate some air pollutant emissions consisting primarily of fugitive dust. Such emissions would be temporary and would not result in exceedances of air quality standards. Dust control measures would be a condition for grading in the contract documents. Thus, the Calabazas Creek Flood Control Project will be consistent with the Clean Air Act.

Clean Water Act—Section 404

Section 404 addresses the preservation of water quality and, consequently, requires that the Corps of Engineers evaluate the impacts of the discharge of dredged or fill material into waters of the United States. The proposed project will be reviewed for a State Water Quality Certificate in conformance with Section 404. A 404 permit will be obtained prior to commencement of construction.

Wild and Scenic Rivers Act

This act established a program for the federal protection of selected rivers and river sections which are free flowing and possess certain remarkable features. Calabazas Creek is not designated wild and scenic. Therefore, this Act is not applicable to Calabazas Creek and the proposed project.

National Historic Preservation Act—Section 106

Section 106 of this Act establishes eligibility for inclusion in the National Register of Historic Places. To make such a determination, all prehistoric and historic resources have been identified within the project boundaries. Impacts to those cultural resources on or eligible for inclusion in the National Register must be mitigated in conformance with the procedures established by the Advisory Council on Historic Preservation. The contract documents will require that earthmoving activities be monitored by a qualified archaeologist in those areas where possibly significant sites have been identified. The archaeologist would then examine any exposed cultural materials and make appropriate recommendations. Thus, the project will comply with the National Historic Preservation Act.

Endangered Species Act—Section 7

Section 7 requires federal agencies to consult with the Secretary of the Interior through the U. S. Fish and Wildlife Service to avoid impacting any endangered or threatened species. No listed species are found in this reach of Calabazas Creek. As a result, the proposed project will comply with Section 7.

B. State Plans and Policies

The following discussion addresses the Calabazas Creek Flood Control Project's conformance to the appropriate State plans and policies.

State of California Wetlands Policy

This policy applies to the protection of marshlands and other wetlands. The channel improvements proposed by the Calabazas Creek Flood Control Project fall within the jurisdiction of this policy. Though the project would alter inland wetlands, the project will be consistent with this policy because the wetlands will be replaced.

State of California Department of Fish & Game Streambed Alteration Agreements

Streambed Alteration Agreements are required under State Resources Code Sections 1601 and 1603. Agreements for maintenance activities have been developed for existing facilities. Appendix V contains the Memorandum of Understanding (MOU) for routine maintenance activities in improved channels. A MOU and Section 1601 Agreement for construction and maintenance of this project are included in Appendix S-VI.

C. Regional Plans and Policies

San Francisco Bay Conservation and Development Commission

BCDC has jurisdiction and strict fill policies regarding total wetlands. The limit of BCDC jurisdiction is downstream of this project near the confluence of Guadalupe Slough and Sunnyvale East Outfall. No BCDC permit will be required for this project.

APPENDIX E

BIBLIOGRAPHY

1. Santa Clara Valley Water District: Planning Study Report for the Calabazas Creek Flood Control Project, Bayshore Freeway to Guadalupe Slough, June, 1977

2. Santa Clara Valley Water District: Engineers Report and Final Environmental Impact Report on a Proposed Flood Control Project for Calabazas Creek (Bayshore Freeway to El Camino Real), March, 1975

3. Santa Clara Valley Water District: Calabazas Creek, Lawrence Expressway to El Camino Real, Planning Study Consisting of the Final Engineers Report, March, 1978

4. SCVWD: Hydrology Documentation for the North Central Flood Control Zone, June, 1964

5. Krone, R.B., Sedimentation in South San Francisco Bay Below Dumbarton Bridge, March, 1972

6. U. S. Geological Survey: Interim Report on Streamflow, Sediment Discharge and Water Quality in the Calabazas Creek Basin, Santa Clara County, CA, April, 1978

7. SCVWD: Fuel Leak Site Activity Report, October, 1988

8. California Regional Water Quality Control Board, San Francisco Bay Region: South Bay Site Management System Quarterly Report, October to December, 1988

9. Federal Emergency Management Agency, Federal Insurance Administration: Flood Insurance Study, City of Cupertino, CA, Santa Clara Co., November, 1979

10. FEMA, FIA: Flood Insurance Study, City of Sunnyvale, CA, Santa Clara County, November, 1977

11. FEMA, FIA: Flood Insurance Study, City of Santa Clara, CA, Santa Clara Co., January, 1980

12. Nolte, George S.: Improvement of Calabazas Creek One Half Mile South of Stevens Creek Road to El Camino Real, April, 1956

13. SCVWD: Final Engineers Report on Proposed Flood and Erosion Control Measures for Calabazas Creek (Stevens Creek Blvd. to Interstate 280), September, 1977

14. U. S. Army Corps of Engineers: San Francisco Bay Tidal Study, June, 1984

15. Sanders, Susan D. Ph.D.: Calabazas Creek HEP Analysis, April, 1987

16. Sanders, Susan D. Ph.D.: Calabazas Creek From Guadalupe Slough to Highway 101, Santa Clara County, California Impact Analysis for Proposed Flood Control Project, PAR & Associates, November, 1988

17. Sanders, Susan D. et al: Visual Assessment and Biological Survey of Calabazas Creek, Riparian Systems, October, 1985

18. SCVWD: District Groundwater Recharge Facilities, December, 1977

19. Botti, F. D., Warencycia, D. Becker. 1986. Utilization by salt march harvest mice (Reithrodotomys raviventris halicoetis) of a non-pickleweed marsh. California Fish and Game 72 (1): 62-64.

20. Fisler, G. F. 1965. Adaptations and speciation in harvest mice of the marshes of the San Francisco Bay. University of California Publications in Zoology. University of California, Berkeley. 108 pp.

21. Hobson, K. P. Perine, E. B. Roberts, M. L. Foster, and P. Woodin. 1985. A breeding season survey of salt marsh yellowthroats (Geothlypis trichas sinuosa) in the San Francisco Bay Region. Prepared for the U. S. Fish and Wildlife Service, Sacramento, California. Contract No. 84-57. Revised March 1966. 93 pp.

22. Manolis, T. 1978. Status of the black rail in Central California. Western Birds. 9:151-158.

23. Page, G. 1988. Biologist. Point Reyes Bird Observatory. Stinson Beach, California. Telephone conversation with Susan Sanders, April 5, 1988.

24. Remsen, J. V. 1978. Bird Species of Special Concern in California. The Resources Agency, Department of Fish and Game. PRW-54-R-9 Nongame Wildlife Investigations Wildlife Management Branch Administrative Report 78-1.

25. Sorenson, P. 1988. Biologist. U. S. Fish and Wildlife Service, Endangered Species Office. Sacramento, California. Telephone conversation with Susan Sanders, March 31, 1988.

26. USFWS. 1984. Salt marsh harvest mouse and California clapper rail recovery plan. U. S. Fish and Wildlife Service. Portland, Oregon. 141 pp.

27. Zetterquist, D. K. 1977. The salt marsh harvest mouse (Reithrodontomys raviventris raviventris) in marginal habitats. Wasmann Journal of Biology. 35(1):68-76.

APPENDIX F

DETAILED COST ESTIMATES

Total Cost Reaches 1-25

Reach 1	$ 2,494,410
Reach 2	1,118,511
Reach 3	2,123,434
Reach 4	1,679,212
Reach 5	929,939
Reach 8	1,756,344
Reach 9	824,490
Reach 10	269,223
Reach 11	859,555
Reach 12	1,848,648
Reach 13	400,589
Reach 15	1,414,685
Reach 16	691,200
Reach 25	153,144
Total	$16,563,384

CALABAZAS CREEK
Reach 1 (U/S Lawrence Expressway to U/S Lochinvar Avenue)
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Site Preparation				
Clearing and Grubbing	$ 5,300	acre	3.45	$ 18,285
Remove Rubble/Rock	40	c.y.	1520	60,800
Ramp/Channel Modifications				
Rock Lining	40	c.y.	1000	40,000
Gabion Slope Protection	160	c.y.	2645	423,200
Concrete Transition Lining	300	c.y.	250	75,000
Access Ramp	7	s.f.	7020	49,140
Channel Excavation	8	c.y.	21000	168,000
Backfill	15	c.y.	790	11,850
Concrete Removal	100	c.y.	40	4,000
Concrete Grout	50	s.y.	770	38,500
Augment Culverts				
Concrete Removal	100	c.y.	20	2,000
Structural Concrete	450	c.y.	170	76,500
Excavation	11	c.y.	400	4,400
Utility Relocation	40,000	ea.	2	80,000
Outfalls	3,200	ea.	3	9,600
Traffic Control	50,000	l.s.	1	50,000
Roadway Replacement				
Remove A/C Pavements	2	s.f.	1200	2,400
Remove Curb and Gutter	2	l.f.	44	88
Remove Sidewalk	2	s.f.	180	360
A/C Pavement	5	s.f.	1200	6,000
Curb and Gutter	16	l.f.	44	704
Sidewalk	6	s.f.	180	1,080
Miscellaneous				
6 Ft. Chain Link Fence	11	l.f.	1900	20,032
SUBTOTAL				$1,141,939
Mobilization (8%)				91,355
Construction Contingencies (15%)				171,291
TOTAL CONSTRUCTION COSTS				$1,404,585
Engineering Design, Administration & Inspection (18%)				252,825
Right of Way				750,000
Mitigation (Revegetation: 1.6 Acres, ~625 Plants)				87,000
TOTAL PROJECT COSTS				$2,494,410

CALABAZAS CREEK
Reach 2 (U/S Lochinvar Avenue to U/S Homestead Road)
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Site Preparation				
Clearing and Grubbing	$ 5,300	acre	1.9	$ 10,070
Remove Rubble/Rock	40	c.y.	725	29,000
Ramp/Channel Modifications				
Gabion Slope Protection	160	c.y.	1175	188,000
Concrete Transition Lining	300	c.y.	250	75,000
Access Ramp	7	s.f.	3350	23,450
Channel Excavation	8	c.y.	10250	82,000
Backfill	15	c.y.	350	5,250
Augment Culverts				
Concrete Removal	100	c.y.	20	2,000
Structural Concrete	450	c.y.	225	101,250
Excavation	11	c.y.	800	8,800
Utility Relocation	40,000	ea.	3	120,000
Outfalls	3,200	ea.	3	9,600
Traffic Control	50,000	l.s.	1	50,000
Roadway Replacement				
Remove A/C Pavements	2	s.f.	2400	4,800
Remove Curb and Gutter	2	l.f.	44	88
Remove Sidewalk	2	s.f.	180	360
A/C Pavement	5	s.f.	2400	12,000
Curb and Gutter	16	l.f.	44	704
Sidewalk	6	s.f.	180	1,080
Miscellaneous				
6 Ft. Chain Link Fence	11	l.f.	200	2,200
SUBTOTAL				$725,652
Mobilization (8%)				58,052
Construction Contingencies (15%)				108,848
TOTAL CONSTRUCTION COSTS				$892,552
Engineering Design, Administration and Inspection (18%)				160,659
Right of Way				13,300
Mitigation (Revegetation: 0.5 Acres, ~375 Plants)				52,000
TOTAL PROJECT COSTS				$1,118,511

CALABAZAS CREEK
Reach 3 (U/S Homestead Road to U/S Pruneridge Avenue)
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Site Preparation				
Clearing and Grubbing	$ 5,300	acre	3.9	$ 20,670
Remove Rubble/Rock	40	c.y.	950	38,000
Ramp/Channel Modifications				
Gabion Slope Protection	160	c.y.	3850	616,000
Concrete Transition Lining	300	c.y.	250	75,000
Access Ramp	7	s.f.	3350	23,450
Channel Excavation	8	c.y.	8625	69,000
Backfill	15	c.y.	1025	15,375
Augment Culverts				
Concrete Removal	100	c.y.	15	1,500
Structural Concrete	450	c.y.	175	78,750
Excavation	11	c.y.	500	5,500
Utility Relocation	40,000	ea.	1	40,000
Outfalls	3,200	ea.	3	9,600
Traffic Control	50,000	l.s.	1	50,000
Roadway Replacement				
Remove A/C Pavements	2	s.f.	1375	2,750
Remove Curb and Gutter	2	l.f.	36	72
Remove Sidewalk	2	s.f.	150	300
A/C Pavement	5	s.f.	1370	6,850
Curb and Gutter	16	l.f.	36	576
Sidewalk	6	s.f.	150	900
Miscellaneous				
6 Ft. Chain Link Fence	11	l.f.	2520	27,720
SUBTOTAL				$1,082,013
Mobilization (8%)				86,561
Construction Contingencies (15%)				162,302
TOTAL CONSTRUCTION COSTS				$1,330,876
Engineering Design, Administration and Inspection (18%)				239,558
Right of Way				400,000
Mitigation (Revegetation: 2.3 Acres, ~1100 Plants)				153,000
TOTAL PROJECT COSTS				$2,123,434

CALABAZAS CREEK
Reach 4 (U/S Homestead Road to U/S Pruneridge Avenue)
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Site Preparation				
Clearing and Grubbing	$ 5,300	acre	3	$ 15,900
Remove Rubble/Rock	40	c.y.	1525	61,000
Ramp/Channel Modifications				
Gabion Slope Protection	160	c.y.	2900	464,000
Concrete Transition Lining	300	c.y.	250	75,000
Access Ramp	7	s.f.	3350	23,450
Channel Excavation	8	c.y.	9775	78,200
Backfill	15	c.y.	1475	22,125
Augment Culverts				
Concrete Removal	100	c.y.	25	2,500
Structural Concrete	450	c.y.	250	112,500
Excavation	11	c.y.	600	6,600
Utility Relocation	40,000	ea.	4	160,000
Outfalls	3,200	ea.	3	9,600
Traffic Control	50,000	l.s.	1	50,000
Roadway Replacement				
Remove A/C Pavements	2	s.f.	1970	3,940
Remove Curb and Gutter	2	l.f.	44	88
Remove Sidewalk	2	s.f.	180	360
A/C Pavement	5	s.f.	1970	9,850
Curb and Gutter	16	l.f.	44	704
Sidewalk	6	s.f.	180	1,080
Miscellaneous				
6 Ft. Chain Link Fence	11	l.f.	700	7,700
SUBTOTAL				**$1,104,597**
Mobilization (8%)				88,368
Construction Contingencies (15%)				165,690
TOTAL CONSTRUCTION COSTS				**$1,358,654**
Engineering Design, Administration and Inspection (18%)				244,558
Right of Way				0
Mitigation (Revegetation: 1.5 Acres, ~500 Plants)				76,000
TOTAL PROJECT COSTS				**$1,679,212**

CALABAZAS CREEK
Reach 5 (U/S Tantau Avenue to U/S Interstate 280)
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Site Preparation				
Clearing and Grubbing	$ 5,300	acre	2	$ 10,600
Remove Rubble/Rock	40	c.y.	700	28,000
Ramp/Channel Modifications				
Gabion Slope Protection	160	c.y.	2000	320,000
Concrete Transition Lining	300	c.y.	250	75,000
Access Ramp	7	s.f.	1675	11,725
Channel Excavation	8	c.y.	8950	71,600
Backfill	15	c.y.	425	6,375
Augment Culverts				
Utility Relocation	40,000	ea.	1	40,000
Outfalls	3,200	ea.	1	3,200
Miscellaneous				
6 Ft. Chain Link Fence	11	l.f.	2300	25,300
SUBTOTAL				$591,800
Mobilization (8%)				47,344
Construction Contingencies (15%)				88,770
TOTAL CONSTRUCTION COSTS				$727,914
Engineering Design, Administration and Inspection (18%)				131,025
Right of Way				0
Mitigation (Revegetation: 0.8 Acres, ~500 Plants)				71,000
TOTAL PROJECT COSTS				$929,939

CALABAZAS CREEK
Reach 8 (U/S Stevens Creek Boulevard to U/S Miller Avenue)
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Site Preparation				
Clearing and Grubbing	$ 5,300	acre	0.8	$ 4,240
Remove Rubble/Rock	40	c.y.	1520	60,800
Ramp/Channel Modifications				
Gabion Slope Protection	160	c.y.	2450	392,000
Concrete Transition Lining	300	c.y.	400	120,000
Access Ramp	7	s.f.	1675	11,725
Channel Excavation	8	c.y.	5125	41,000
Backfill	15	c.y.	1375	20,625
Clear Span Bridge				
Concrete Removal	100	c.y.	150	15,000
Excavation	11	c.y.	300	3,300
Utility Relocation	40,000	ea.	3	120,000
Traffic Control	50,000	l.s.	1	50,000
Clear Span Bridge	85	s.f.	2700	229,500
Bridge Removal	11,600	l.s.	1	11,600
Roadway Replacement				
Remove A/C Pavements	2	s.f.	2870	5,740
Remove Curb and Gutter	2	l.f.	70	140
Remove Sidewalk	2	s.f.	280	560
A/C Pavement	5	s.f.	2870	14,350
Curb and Gutter	15	l.f.	70	1,050
Sidewalk	6	s.f.	280	1,680
SUBTOTAL				$1,103,310
Mobilization (8%)				88,265
Construction Contingencies (15%)				165,497
TOTAL CONSTRUCTION COSTS				$1,357,071
Engineering Design, Administration and Inspection (18%)				244,273
Right of Way				0
Mitigation (Revegetation: 1.6 Acres, ~1100 Plants)				155,000
TOTAL PROJECT COSTS				$1,756,344

CALABAZAS CREEK
Reach 9 (Guadalupe Slough to U/S Highway 237)
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Site Preparation				
Clearing and Grubbing	$ 5,300	acre	5.5	$ 29,150
Floodwall Construction				
Structural Concrete	450	c.y.	90	40,500
Levee Modifications				
Excavation	5	c.y.	15600	78,000
Levee Embankment	7	c.y.	14500	101,500
Aggregate Road Surface	0.55	s.f.	57000	31,350
Levee Reinforcement	115	msf	50	5,750
Bridge Modifications				
Structural Concrete	450	c.y.	20	9,000
Concrete Channel Lining	260	c.y.	575	149,500
Bridge Reinforcement	26,000	l.s.	1	26,000
Bridge Sealing	42,000	l.s.	1	42,000
Miscellaneous				
Extend Outfalls	25,000	l.s.	1	25,000
SUBTOTAL				$537,750
Mobilization (8%)				43,020
Construction Contingencies (15%)				80,663
TOTAL CONSTRUCTION COSTS				$661,433
Engineering Design, Administration and Inspection (18%)				119,058
Right of way				0
Mitigation (Revegetation: 1.7 Acres)				44,000
TOTAL PROJECT COSTS				$824,490

CALABAZAS CREEK
Reach 10 (U/S Highway 237 to U/S Old Mountain View-Alviso Road)
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Site Preparation				
Clearing and Grubbing	$ 5,300	acre	0.84	$ 4,452
Levee Modifications				
Excavation	5	c.y.	1200	6,000
Levee Embankment	7	c.y.	2700	18,900
Aggregate Road Surface	0.55	s.f.	8500	4,675
Levee Reinforcement	115	msf	11	1,265
Depressed Maintenance Road				
Backfill	7	c.y.	1200	8,400
Aggregate Road Surface	0.90	s.f.	6000	5,400
Bridge Modifications				
Structural Concrete	450	c.y.	12	5,400
Concrete Channel Lining	260	c.y.	100	26,000
Bridge Reinforcement	11,000	l.s.	1	11,000
Bridge Sealing	44,000	l.s.	1	44,000
Traffic Control	50,000	l.s.	1	50,000
SUBTOTAL				$185,492
Mobilization (8%)				14,839
Construction Contingencies (15%)				27,824
TOTAL CONSTRUCTION COSTS				$228,155
Engineering Design, Administration and Inspection (18%)				41,068
TOTAL PROJECT COSTS				$269,223

CALABAZAS CREEK
Reach 11 (U/S Old Mountain View-Alviso Road to U/S Tasman Drive)
Cost Estimate Summary

Item	*Unit Cost*	*Unit*	*Quantity*	*Amount*
Site Preparation				
Clearing and Grubbing	$ 5,300	acre	6	$ 31,800
Levee/Channel Modifications				
Excavation	5	c.y.	10000	50,000
Levee Embankment	7	c.y.	27300	191,100
Aggregate Road Surface	0.55	s.f.	62000	34,100
Levee Reinforcement	115	msf	135	15,525
Depressed Maintenance Road				
Backfill	7	c.y.	9800	68,600
Aggregate Road Surface	0.90	s.f.	94000	84,600
Bridge Modifications				
Structural Concrete	450	c.y.	7	3,150
Concrete Channel Lining	260	c.y.	140	36,400
Traffic Control	50,000	l.s.	1	50,000
Miscellaneous				
Raise Electrical Line	2,100	l.s.	1	2,100
Drainage	21,000	l.s.	1	21,000
Well Extensions	550	ea.	7	3,850
SUBTOTAL				$592,225
Mobilization (8%)				45,378
Construction Contingencies (15%)				88,834
TOTAL CONSTRUCTION COSTS				$728,437
Engineering Design, Administration and Inspection (18%)				131,119
TOTAL PROJECT COSTS				$859,555

CALABAZAS CREEK
Reach 12 (U/S Tasman Drive to U/S Highway 101)
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Site Preparation				
Clearing and Grubbing	$ 5,300	acre	12	$ 63,600
Floodwall Construction				
Structural Concrete	450	c.y.	2000	900,000
Levee Modifications				
Excavation	5	c.y.	6900	34,500
Levee Embankment	7	c.y.	10200	71,400
Aggregate Road Surface	0.55	s.f.	118000	64,900
Levee Reinforcement	115	msf	100	11,500
Miscellaneous				
PG&E Gas Main Relocation	68,000	l.s.	1	68,000
Stormdrain Flapgates	1,100	ea.	7	7,700
Traffic Control	25,000	l.s.	1	25,000
Archaeological Monitoring	2,100	l.s.	1	2,100
Modifications at Hetch-Hetchy Pipeline Crossing	25,000	l.s.	1	25,000
SUBTOTAL				$1,273,700
Mobilization (8%)				101,896
Construction Contingencies (15%)				191,055
TOTAL CONSTRUCTION COSTS				$1,566,651
Engineering Design, Administration and Inspection (18%)				281,997
TOTAL PROJECT COSTS				$1,848,648

CALABAZAS CREEK
Reach 13 (U/S Highway 101 to U/S Arques Avenue)
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Site Preparation				
Clearing and Grubbing	$ 5,300	acre	1.53	$ 8,109
Ramp/Channel Modifications				
Embankment	11	c.y.	5650	62,150
Concrete Lining	260	c.y.	350	91,000
Structural Concrete	450	c.y.	35	15,750
Augment Culverts				
Structural Concrete	450	c.y.	10	4,500
Traffic Control	25,000	l.s.	1	25,000
Miscellaneous				
Chain Link Fence	11	l.f.	3550	39,050
Aggregate Road Surface	0.55	s.f.	53350	29,343
Stormdrain Flapgates	1,100	ea.	1	1,100
SUBTOTAL				$276,002
Mobilization (8%)				22,080
Construction Contingencies (15%)				41,400
TOTAL CONSTRUCTION COSTS				$339,482
Engineering Design, Administration and Inspection (18%)				61,107
TOTAL PROJECT COSTS				$400,589

CALABAZAS CREEK
Reach 15 (U/S Cemtral Expressway to U/S Kifer Road)
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Site Preparation				
Clearing and Grubbing	$ 5,300	acre	0.43	$ 2,279
Ramp/Channel Modifications				
Embankment	11	c.y.	250	2,750
Concrete Lining	260	c.y.	150	39,000
Structural Concrete	450	c.y.	275	123,750
Augment Culverts				
Structural Concrete	450	c.y.	15	6,750
Traffic Control	25,000	l.s.	1	25,000
Clear Bridge Span				
Structural Concrete	85	s.f.	4230	359,550
Utility Relocation	40,000	l.s.	6	240,000
Traffic Control	50,000	l.s.	1	50,000
Concrete Removal	100	c.y.	50	5,000
Bridge Removal	150	c.y.	250	37,500
Road Replacement	6	s.f.	4250	25,500
Miscellaneous				
Chain Link Fence	10	l.f.	2500	25,000
Aggregate Road Surface	0.55	s.f.	37500	20,625
Stormdrain Flapgates	1,100	ea.	9	9,900
Archaeological Monitoring	2,100	l.s.	1	2,100
SUBTOTAL				$ 974,704
Mobilization (8%)				77,976
Construction Contingencies (15%)				146,206
TOTAL CONSTRUCTION COSTS				$1,198,886
Engineering Design, Administration and Inspection (18%)				215,799
TOTAL PROJECT COSTS				$1,414,685

CALABAZAS CREEK
Reach 16 (U/S Kifer Road to U/S S.P.R.R.)
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Site Preparation				
Clearing and Grubbing	$ 5,300	acre	1.1	$ 5,830
Augment Channel				
Concrete Removal	100	c.y.	100	10,000
Concrete Lining	260	c.y.	100	26,000
Structural Concrete	450	c.y.	225	101,250
Augment Culverts				
Structural Concrete	450	c.y.	250	112,500
Utility Relocation	40,000	ea.	1	40,000
Precast Culvert	2,100	l.f.	80	168,000
Excavation	11	c.y.	1150	12,650
SUBTOTAL				$476,230
Mobilization (8%)				38,098
Construction Contingencies (15%)				71,435
TOTAL CONSTRUCTION COSTS				$585,763
Engineering Design, Administration and Inspection (18%)				105,437
TOTAL PROJECT COSTS				$691,200

CALABAZAS CREEK
Reach 25 (U/S Pomeroy Avemue to U/S Benton Street)
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Floodwall Construction				
Structural Concrete	450	c.y.	150	67,500
Augment Channel				
Concrete Removal	100	c.y.	50	5,000
Concrete Lining	260	c.y.	120	31,200
Miscellaneous				
Aggregate Road Surface	0.55	s.f.	3300	1,815
SUBTOTAL				$105,515
Mobilization (8%)				8,441
Construction Contingencies (15%)				15,827
TOTAL CONSTRUCTION COSTS				$129,783
Engineering Design, Administration and Inspection (18%)				23,361
TOTAL PROJECT COSTS				$153,144

APPENDIX G

NATIONAL FLOOD INSURANCE PROGRAM

Floods are the most serious natural hazard facing the American people. Of the natural disasters in this country, 90 percent are flood-related. Since 1936, over $11 billion in federal appropriations have been spent to build flood control works to prevent or reduce flood losses. Despite that investment, flood losses continue to increase. The U. S. Water Resources Council estimates that urban flood losses exceed $1.5 billion each year.

The National Flood Insurance Program (NFIP) was created by the Congress in 1968 to mitigate the effect on communities and individuals of property damage due to floods and flood-related hazards. The NFIP enabled property owners to purchase flood insurance at a reasonable rate. Such insurance is designed to reduce the escalating costs of property damage caused by floods and is generally unavailable from private sector insurance companies. The program is based on an agreement between local communities and the federal government that if a community will implement programs to reduce future flood risks, the federal government will make flood insurance available within the community as a financial protection against flood losses which do occur.

The NFIP has two objectives—to make flood insurance available for existing structures in floodprone areas and to require that local governments regulate location and construction of new buildings to minimize future flood losses. Extensive public subsidies are required to make flood insurance affordable for owners of existing structures. This cost is offset by reduction in future disaster relief appropriations, which would result from requiring new construction to be less susceptible to flood damage. Community participation in NFIP and individual purchase of insurance were both voluntary, based on the 1968 Act. The Flood Disaster Protection Act of 1973 made flood insurance mandatory when "federally related financing" was involved in acquiring or developing property located in a defined flood hazard area. Federally related financing includes direct federal grants and loans and mortgage loans by financial institutions insured or regulated by federal agencies such as the Federal Reserve Bank and the Federal Deposit Insurance Corporation. Before property owners can obtain flood insurance, the local community (City or County) must join the Program. Joining in the NFIP requires that those communities with designated flood hazard areas adopt and enforce floodplain management measures that will diminish the impact of future floods.

Once a community has jointed the Program, property owners throughout the community can purchase subsidized insurance to cover structural losses up to $35,000 for a single-family dwelling, $100,000 for a multi-unit dwelling, and $100,000 for nonresidential structures. The annual rate for residential dwellings is $0.55 per $100 of value and for other structures, $0.65 per $100 of value. The minimum homeowners' costs is $192.50 ($0.55 x 350). Also, content losses up to $10,000 for residential units and $100,000 for nonresidential units can be covered at annual rates of $0.65 and $1.30 per $100 of value, respectively. Following the development of flood data needed to fully define floodplain management measures, and their adoption and enforcement by the local community, an additional $150,000 of nonsubsidized insurance (at actuarial rates) will be made available for residential dwellings. The actuarial rates vary, based on the degree of risk.

APPENDIX H

THE 1 PERCENT FLOOD

Definition

The 1 percent flood is that flow of water from a drainage area that, on the average and over a long period of time, has a 1 percent chance (probability of 0.01) of being equalled or exceeded in any given year. It is sometimes referred to as the 100-year flood, but it should not be thought of as an event that occurs regularly every 100th year. Instead, it is the flood flow that would be equalled or exceeded perhaps about 100 times in 10,000 years. It is also possible that two repetitions of this flood flow could occur in a single year, or that a single event may not occur even once in 200 years.

The 1 Percent Flood and the 1 Percent Storm

Another terminology problem is relation of the 1 percent storm and the 1 percent flood. Storm magnitude relates to flood magnitude through a complex set of parameters such as antecedent rainfall conditions, drainage basin shape, length, slope, orientation, and other factors. Therefore, a 1 percent storm will not necessarily produce a 1 percent flood. The 1 percent flood should not be confused with nor should it be referred to as the "1 percent storm" or the "1 percent storm flood."

Cumulative Risk

The 1 percent flood has a small risk of occurrence in a given year, but the risk is cumulative. When compared with the 30-year life of the average home loan, for example, the chance that such a flood will occur is quite large. During the 30-year loan period, the chance that a 1 percent flood will occur, or will be exceeded, approaches 30 percent.

The "1 Percent Flood" and the "Design Flood"

Another relationship that requires explanation is that which exists between the "1 percent flood" and a "design flood." A design flood is any particular flood magnitude chosen for designing a flood control project. A design flood could be the 1 percent flood or it could also be a flood of another frequency of occurrence. The 1 percent design flood (used by the District as its design standard) represents the expected future flow of water from a watershed without constriction, undue storage or delay. The 1 percent flood under existing watershed conditions (the existing 1 percent flood) is the flood developed from a watershed with existing limited capacity channels. Such a flood is used by the Federal Emergency Management Agency as a standard for its flood insurance program.

1 Percent Peak Flows and 1 Percent Volumes

In general, floods are identified in terms of their peak flows and volumes. In practice, the 1 percent flood refers to the **1 percent peak flow rate** when designing flood control channels and similar water structures. The 1 percent flood also refers to the **1 percent volume** of water when defining overbank storage or when designing flood retention and detention facilities.

The District's Hydrology and the 1 Percent Flood

The magnitude of the 1 percent flood is calculated using statistical hydrologic methods. The District uses a uniform method of determining the 1 percent flood; one that is regional in scope and based on the best available rainfall and runoff information from areas within and adjacent to the County. The regional process utilized by the District was developed after considerable effort and has been reviewed and approved by the academic and professional communities.

Factors Affecting Floods

The major causes of floods are the preceding storms and their intensity distributions. Other factors that would affect the peaks and/or volumes of floods relate to the physical characteristics of watersheds, either rural or urban.

For rural watersheds these factors are: slope, groundcover, basin shape, soil type, etc. For urban watersheds natural conditions are modified by increasing the impervious areas and by making the flow paths more efficient. Roof tops, pavement rain gutters, downspouts, curbs, storm drains, levees and culverts can increase the volumes and peaks of flood flows, especially in hilly terrain with steep slopes.

In the flat land, the limited capacity of the storm drainage system and the conditions of the levees along the adjacent channels may reduce the peaks of larger urban floods and thereby retain the water in the urban watershed for a longer time. This may serve to increase local flooding of urban areas and cause no increase in the flow within the main channel. Therefore, depending on the local conditions, urbanization could have the effect of increasing or decreasing the flow in the main channels.

A. D. Saah
District Hydrologist
March 21, 1989

APPENDIX I

ESTABLISHING THE 1 PERCENT STARTING WATER SURFACE FOR CALABAZAS CREEK AT GUADALUPE SLOUGH

April 1988

The controlling 1 percent flood water surface elevation for Calabazas Creek is the 1 percent flood water surface elevation at the Guadalupe Slough confluence. The 1 percent flood water surface profile developed for Guadalupe Slough indicates that the 1 percent design water surface elevation at the Calabazas Creek confluence is 1.75 feet higher (elevation 12.25) than the 1 percent water surface elevation used in the 1978 Engineer's Report on Calabazas Creek and the subsequent design. This increase in the Guadalupe Slough design water surface will increase the design water surface on Calabazas Creek for about 2 miles upstream to Highway 101.

The 1978 Engineer's Report on Calabazas Creek, from Guadalupe Slough to Highway 101, used a starting 1 percent flood water surface elevation of 10.5 feet. No documentation of the development of the 1978 water surface elevation at the confluence has been located. The 1973 Baylands Study estimated a 1 percent tide elevation of 6.5 feet NGVD. This may have been used for the 1978 design. Subsequent studies have established higher 1 percent tide levels. The flood insurance studies estimated 7.2 feet NGVD in the late 1970s. The Corps Shoreline Reconnaissance Report in 1981 also used 7.2. In 1984 the Corps issued the San Francisco Bay Tidal Stage vs. Frequency Study which identified the 1 percent tide at Guadalupe Slough to be 8.2. This new 1 percent tide elevation is nearly 2 feet higher than the previous Calabazas design.

Guadalupe Slough was modeled and analyzed using HEC-2. Modeling the 1 percent flood flow in Guadalupe Slough was complicated by uncertainties concerning hydrology of the four tributary streams and the channel topography. Below is a discussion of the parameters used in the study.

The flow rates for Guadalupe Slough were based on coincident occurrence of the peak flows in its tributaries (Table I-1). The District's design flood peak flows were used for Calabazas Creek and San Tomas Creek. The flood peak flows from the City of Sunnyvale's Flood Insurance Study were used for Sunnyvale Outfall East. The 10 percent flood peak flow for Sunnyvale Outfall West was developed using the preliminary SCVWD urban drainage area vs. maximum discharge curve. The 1 percent flood peak flow was estimated by multiplying the 10 percent peak flow by the ratio of the 1 percent and 10 percent peak flows on Sunnyvale Outfall East. Table I-2 summarizes the resulting flow rates for Guadalupe Slough.

For this model, the 1971 Baylands Flood Control Planning Study topographic data was used. Because no major work has been done in the channel itself since then, this data was assumed adequate for our purposes. To model the design condition, no overtopping of the levees was assumed.

A Manning's n value of 0.030 was used for existing and design conditions.

The starting water surface for the downstream end of Guadalupe Slough is the water surface of the San Francisco Bay and is dependent on the tide. The District's design guideline is to use the higher water surface resulting from a 1 percent flood peak flow rate coincident with mean higher high water (MHHW) or a 10 percent flood peak flow rate coincident with the highest estimated tide (HET). This is the guideline established by the Army Corps of Engineers. At the downstream end of Guadalupe Slough the HET and MHHW are 8.1 feet NGVD and 4.7 feet NGVD, respectively. The 10 percent flood flows (10,840 cfs) and the HET (8.1 NGVD) resulted in the highest water surfaces from the Bay to about 3 miles upstream. At the Calabazas confluence, the higher water surface was generated by the 1 percent flood flows (16,350 cfs) and MHHW (4.7 NGVD). The starting water surface elevation is 12.25 NGVD at the confluence.

TABLE I-1

1 PERCENT AND 10 PERCENT PEAK FLOW RATES OF GUADALUPE SLOUGH TRIBUTARIES

Creek	Drainage Area (MI^1)	Peak Flow Rates (cfs) 1%	Peak Flow Rates (cfs) 10%
Calabazas Creek	21	4,300	2,800
San Tomas Aquino Creek[2]	45	10,000	6,500
Sunnyvale East Outfall[1]	7.0	1,200	900
Sunnyvale West Outfall	5.4	850[3]	641[4]
Totals	76.4	16,350	10,840

[1] From City of Sunnyvale FIS

[2] Estimated from Design Flood Flows Manual value of 9,100 cfs at San Tomas Creek downstream Saratoga Creek (9,100 cfs @ 39 sq. mi. + 900 cfs for 6 sq. mi.)

[3] Ratioed per 1% and 10% flows on Sunnyvale East (1200/900 x 641 = 850)

[4] Developed using preliminary SCVWD urban drainage area vs. maximum discharge curve.

TABLE I-2

1 PERCENT AND 10 PERCENT PEAK FLOW RATES ON GUADALUPE SLOUGH

Location	Station	Peak Flow Rates (cfs) 1%	Peak Flow Rates (cfs) 10%
San Francisco Bay	0+00	16,350	10,840
U/S Sunnyvale Outfall West	243+00	15,500	10,200
U/S Sunnyvale Outfall East	307+00	14,200	9,300

APPENDIX J

WILDLIFE SPECIES LIST

APPENDIX J

WILDLIFE SPECIES LIST

The following list includes actual and potential occurrences of wildlife species along seven reaches of Calabazas Creek, Santa Clara Co., from the Lawrence Expressway to Miller Avenue. "X" indicates a species actually detected during field surveys of the creek on 18 and 19 September and 17 October 1985; potentially occurring species are also listed below. The bird names and order follow the American Ornithologist's Union Chicklist of North American Birds (1983).

REACH	1A	1B	1C	2	3A	3B	4A	4B	5	6	8	COMMENTS
BIRDS												
Great Blue Heron (*Ardea herodias*)												
Great Egret (*Casmerodius albus*)												
Mallard (*Anas platyrhynchos*)												
Turkey Vulture (*Gymnogyps californianus*)				X								Fly-over
Black-shouldered Kite (*Elanus caeruleus*)												
Sharp-shinned Hawk (*Accipiter striatus*)												
Cooper's Hawk (*A. cooperii*)												
Red-tailed Hawk (*Buteo jamaicensis*)				X	X							Resident
American Kestrel (*Falco sparverius*)						X				X		Resident
Killdeer (*Charadrius vociferus*)	X											Resident
California Gull (*Larus californicus*)										X		Fly over
Rock Dove (*Columba livia*)		X								X		Introduced
Mourning Dove (*Zenaida macroura*)	X	X	X	X	X	X	X	X	X	X	X	Resident

BIRDS	1A	1B	1C	2	3A	3B	4A	4B	5	6	8	COMMENTS
Common Barn-Owl (Tyto alba)												
Great Horned Owl (Bubo virginianus)												
Anna's Hummingbird (Calypte anna)		X	X	X	X	X	X			X	X	Reside t
Rufous Hummingbird (Selasphorus rufus)												
Belted Kingfisher (Ceryle alcyon)												
Nuttall's Woodpecker (Picoides nuttallii)												
Downy Woodpecker (P. pubescens)				X	X							Reside
Northern Flicker (Colaptes auratus)		X			X							Resident
Western Wood Pewee (Contopus sordidulus)							X					Migrant
Western Flycatcher (Empidonax difficilis)		X		X	X		X					Migrant
Dusky Flycatcher (E. oberholseri)					X							Migrant
Black Phoebe (Sayornis nigricans)	X	X		X		X			X	X		Resident
Scrub Jay (Aphelocoma coerulescens)		X	X	X	X	X	X			X		Resident
American Crow (Corvus brachyrhynchos)		X										Resident
Chestnut-backed Chickadee (Parus rufescens)		X	X				X				X	Residen
Bushtit (Psaltriparus minimus)	X		X	X		X	X	X				Reside
House Wren (Troglodytes aedon)							X				X	

BIRDS	1A	1B	1C	2	3A	3B	4A	4B	5	6	8	COMMENTS
Bewick's Wren (*Thryomanes bewickii*)		X	X		X	X	X				X	Resident
White-breasted Nuthatch (*Sitta carolinensis*)												
Ruby-crowned Kinglet (*Regulus calendula*)			X		X							Migrant
American Robin (*Turdus migratorius*)				X			X					
Western Bluebird (*Sialia mexicana*)												
Northern Mockingbird (*Mimus polyglottos*)		X	X	X	X	X				X		Resident
Cedar Waxwing (*Bombycilla cedrorum*)											X	Winter visitor
Loggerhead Shrike (*Lanius ludovicianus*)											X	Resident
European Starling (*Sturnus vulgaris*)	X	X	X	X	X		X					Introduce
Warbling Vireo (*Vireo gilvus*)												
Hutton's Vireo (*V. huttoni*)												
Orange-crowned Warbler (*Vermivora celata*)		X										
Yellow-rumped Warbler (*Dendroica coronata*)					X		X	X				Resident
Common Yellowthroat (*Geothlypis trichas*)									X			Resident
Wilson's Warbler (*Wilsonia pusilla*)												
Western Tanager (*Piranga ludoviciana*)												
Rufous-sided Towhee (*Pipilo erythrophthalmus*)												

BIRDS	1A	1B	1C	2	3A	3B	4A	4B	5	6	8	COMMENTS
Brown Towhee (*P. fuscus*)		X	X	X	X	X	X	X	X	X	X	Resident
Chipping Sparrow (*Spizella passerina*)							X					Migrant
Song Sparrow (*Melospiza melodia*)			X		X							Resident
Lincoln's Sparrow (*M. lincolnii*)					X							Winter visitor
Golden-crowned Sparrow (*Zonotrichia atricapilla*)		X										
White-crowned Sparrow (*Z. leucophrys*)		X		X	X	X		X			X	Winter visitor
Dark-eyed Junco (*Junco hyemalis*)												
Red-winged Blackbird (*Agelaius phoeniceus*)												
Brewer's Blackbird (*Euphagus cyanocephalus*)		X	X		X							Reside
Brown-headed Cowbird (*Molothrus ater*)												
Northern Oriole (*Icterus galbula*)												
Purple Finch (*Carpodacus purpureus*)												
House Finch (*C. mexicanus*)	X	X	X	X	X	X	X	X			X	Resident
Lesser Goldfinch (*Carduelis psaltria*)				X			X					Resident
American Goldfinch (*C. tristis*)			X	X			X					Resident
House Sparrow (*Passer domesticus*)				X			X					Introduced

MAMMALS	1A	1B	1C	2	3A	3B	4A	4B	5	6	8
Virginia Opossum (*Didelphis virginina*)											
Broad-footed Mole (*Scapanus latimanus*)											
Little Brown Myotis (*M. lucifugus*)											
Long-eared Myotis (*M. evotis*)											
California Myotis (*M. californua*)											
Silver-haired Bat (*Lasionycteris noctivagans*)											
Big Brown Bat (*Eptesicus fuscus*)											
Hoary Bat (*Lasiurus cinereus*)											
Pallid Bat (*Antrozous pallidus*)											
Brazilian Free-tailed Bat (*Tadarida brasiliensis*)											
Desert Cottontail (*Sylvilagus audubonii*)											
Black-tailed Hare (*Lepus californicus*)										X	
California Ground Squirrel (*Spermophilus beecheyi*)										X	X
Western Gray Squirrel (*Sciurus griseus*)											
Fox Squirrel (*S. niger*)				X		X					
Botta's Pocket Gopher (*Thomomys bottae*)											

MAMMALS	1A	1B	1C	2	3A	3B	4A	4B	5	6	8
Deer Mouse (*Peromyscus maniculatus*)											
Black Rat (*Rattus rattus*)											
Norway Rat (*R. norvegicus*)											
House Mouse (*Mus musculus*)											
Raccoon (*Procyon lotor*)		X									
Long-tailed Weasel (*Mustela frenata*)											
Striped Skunk (*Mephitis mephitis*)											
Domestic Dog (*Canis familiaris*)											
House cat (*Felis domesticus*)											
REPTILES AND AMPHIBIANS											
Pacific Tree Frog (*Hyla regilla*)											
Western Fence Lizard (*Sceloporus occidentalis*)	X	X	X	X	X	X	X	X	X	X	X

Wildlife Species Observed on Calabazas Creek from Guadalupe Slough to Highway 101. Based on Surveys Conducted on March 19, September 1, and November 2, 1988, by Susan D. Sanders.

Common Name	Scientific Name
BIRDS	
Great Egret	*Casmerodius albus*
Snowy Egret	*Egretta thula*
Green-backed Heron	*Butorides striatus*
Black-crowned Night-heron	*Nycticorax nycticorax*
Mallard	*Anas platyrhynchos*
Northern Pintail	*Anas acuta*
Ruddy Duck	*Oxyura jamaicensis*
Ring-necked Pheasant	*Phasianus colchicus*
Virginia Rail	*Rallus limicola*
Common Moorhen	*Gallinula choropus*
American Coot	*Fulica americana*
Killdeer	*Charadrius vociferus*
Common Snipe	*Gallinago gallinago*
Rock Dove	*Columba livia*
Mourning Dove	*Zenaida macroura*
Anna's Hummingbird	*Calypte anna*
Black Phoebe	*Sayonrnis nigricans*
Bushtit	*Psaltiparus minimus*
Marsh Wren	*Cistothorus palustris*
Northern Mockingbird	*Mimus polyglottos*
Common Yellowthroat	*Geothlypis trichas*
Song Sparrow	*Melospiza melodia*
White-crowned Sparrow	*Zonotrichia leucophrys*
Brewer's Blackbird	*Euphagus cyanocephalus*
House Finch	*Carpodacus mexicanus*
MAMMALS	
Virginia Opossum	*Didelphis virginiana*
Black-tailed Hare	*Lepus californicus*
California Ground Squirrel	*Spermophilus beecheyi*

APPENDIX K

PARTIAL LIST OF PLANT SPECIES FROM CALABAZAS CREEK FROM LAWRENCE EXPRESSWAY TO MILLER AVENUE (1985)

Partial list of plant species from Calabazas Creek, Santa Clara Co., Calif.

Genus	species	sub-specific	Common name	Comments
Acacia	decurrens		silver wattle	ornamental
Acer	negundo	Californica	box elder	native riparian tree
Aesculus	californica		buckeye	native
Agrostis	avenacea		pacific bent-grass	wet-site herb
Agrostis	semiverticellata		bent-grass	wet-site grass
Albizia	julibrissia		silk tree	ornamental
Alnus	rhombifolia		white alder	native riparian tree
Anaphalis	margaritacea		pearly everlasting	dry-site herb
Artemesia	douglasiana		mugwort	
Arundo	donax		giant reed	introduced
Atriplex	canescens		saltbush	revegetation plantings
Atriplex	lentiformis		saltbush	revegetation planting
Atriplex	rosea		redscale saltbush	introduced
Avena	barbata		wild oat	introduced grass
Baccharis	douglasii		seep-willow	riparian herb
Baccharis	pilularis	consanguinea	coyote brush	native shrub
Baccharis	pilularis	pilularis	dwarf coyote brush 'twin peaks'	revegetation planting
Baccharis	viminea		mule fat	native
Brassica	niger		black mustard	
Bromus	catharticus		rescue grass	introduced weed
Bromus	diandrus		rip-gut brome	introduced
Carpobrotus	sp.		iceplant	ornamental
Castanea	sp.		Chestnut	ornamental
Catalpa	sp.		catalpa	ornamental
Centarium	soltitialis		star thistle	dry-site weed
Cirsium	vulgare		common thistle	dry-site weed
Cotaneaster	divericata		cotoneaster	ornamental
Cynodon	dactylon		bermuda grass	introduced grass
Cyperus	eragrostis		umbrella sedge	instream herb
Cyperus	esculentus		chufa	wet-site weed
Echinochloa	crusgalli		barnyard grass	
Ecris	piciodes		bristly ox-tounge	wet-site herb
Epilobium	paniculatum		willow-herb	upland weed
Equisetum	sp.		horsetail	
Eucalyptus	globulus		blue gum	ornamental
Eucalyptus	polyanthemos		red box	ornamental
Festuca	megalura		annual fescue	dry-site weed
Foeniculum	vulgare		fennel	disturbed sites
Fraxinus	latifolia		Oregon ash	native riparian tree
Fraxinus	velutina			
Hedera	helix		English ivy	ornamental
Heteromeles	arbutifolia		toyon	revegetation planting
Juglans	nigra		black walnut	horticultural escape
Juglans	regia		English walnut	horticultural escape
Lathyrus	odorata		garden sweet pea	
Ligustrum	sp.		privet	ornamental
Lolium	perenne		rye-grass	introduced
Malus	sylvestris		common apple	horticultural escape
Marrubium	vulgare		horehound	naturalized ornamental
Melilotus	alba		white sweet clover	

Genus	species	sub-specific	Common name	Comments
Morus	sp.		mulberry	escaped ornamental
Nicotiana	glauca		tree-tobacco	introduced
Olea	europaea		olive	horticultural escape
Opuntia	sp.		nopal, prickly pear	escaped ornamental
Paspalum	dilatatum		Johnson grass	introduced weed
Phalaris	arundinacea		canary reed-grass	introduced
Pinus	radiata		Monterey pine	ornamental
Pistacia	vera		pistachio	horticultural escape
Platanus	racemosa		california sycamore	native riparian tree
Polygonum	aviculare		knotweed	disturbed site weed
Polypogon	persicaris		lady's thumb	wet-site herb
Populus	niger	italica	Lombardy popular	hybridizes with natives
Prunus	amygdalus		almond	horticultural escape
Prunus	armeniaca		apricot	horticultural escape
Prunus	salicina		Japanese plum	horticultural escape
Pyracantha	sp.		fire thorn	ornamental
Quercus	agrifolia		coastal live oak	native upland tree
Quercus	lobata		valley oak	native upland tree
Raphanus	sativus		field mustard	common weed
Rhamnus	californica		coffee berry	revegetation planting
Rincinus	communis		castor bean	escaped ornamental
Rosa	floribunda		multiflora rose	horticulural escape
Rubus	ursinus		blackberry	possible escapes
Rumex	crispus		curly dock	wet-sites
Salix	babylonica		weeping willow	hybridizes with natives
Salix	hindsiana		sandbar willow	native riparian shrub
Salix	laevigata		smooth willow	native riparian tree
Salix	lasiandra		black willow	native riparian tree
Salix	lasiolepis		arroyo willow	native riparian shrub
Salsola	kali	tenuifolia	tumbleweed	introduced weed
Sambucus	mexicana		elderberry	native
Schinus	terebinthifolius		Brazilian pepper tree	ornamental
Sequoia	sempervirens		coast redwood	ornamental plantings
Sida	hederacea		cheese-mallow	dry-site herb
Sonchus	asper		sow-thistle	common weed
Sorghum	halapense		Johnson grass	weed
Symphoricarpos	rivularis		snowberry	native shrub
Toxicodendron	diversiloba		poison oak	naitve shrub or vine
Typha	latifolia		cattail	wet-site herb
Ulmus	parvifolia		small-leafed elm	ornamental
Umbellularia	californica		California bay	native tree
Xanthium	strumarium	canadensis	cocklebur	distubed site weed

Plant Species Observed Along Calabazas Creek from Guadalupe Slough to Highway 101, November 1988, compiled by Virginia Dains.

Scientific Name	Common Name	Family
Acacia decurrens	Acacia	Fabaceae
Alnus rhombifolia	White Alder	Betulaceae
Artemisia douglasiana	Douglas' Mugwort	Asteraceae
Arundo donax	Giant Reed	Poaceae
Atriplex patula ssp.hastata	Hen-Fat	Chenopodiaceae
Atriplex semibaccata	Australian Saltbush	Chenopodiaceae
Avena barbata	Wild Oat	Poaceae
Baccharis douglasii	Douglas Seep-Willow	Asteraceae
Baccharis pilularis ssp. consanguinea	Coyote Brush	Asteraceae
Brassica nigra	Black-mustard	Brassicaceae
Bromus diandrus	Rip-gut Grass	Poaceae
Casuarina stricta	Horsetail-tree	Casuarinaceae
Centaurea solstitialis	Yellow Star-thistle	Asteraceae
Chenopodium ambrosioides	Mexican Tea	Chenopodiaceae
Cirsium vulgare	Bull Thistle	Asteraceae
Convolvulus arvensis	Bindweed	Convolvulaceae
Cynodon dactylon	Bermuda Grass	Poaceae
Cyperus difformis	Umbrella Sedge	Cyperaceae
Distichlis spicata	Salt Grass	Poaceae
Echinochloa crusgalli	Barnyard Grass	Poaceae
Epilobium paniculatum	Willow-Herb	Onagraceae
Equisetum hyemale var. affine	Horsetail	Equisetaceae
Eriodictyon californicum	Yerba Santa	Hydrophyllaceae
Eschscholzia californica	California Poppy	Papaveraceae

Scientific Name	Common Name	Family
Eucalyptus camaldulesis	Red River Gum	Myrtaceae
Ficus carica	Garden Fig	Moraceae
Foeniculum vulgare	Anise	Apiaceae
Frankenia grandifolia var. campestris	Alkali Heath	Frankeniaceae
Fraxinus latifolia	Oregon Ash	Oleaceae
Grindelia camporum	Gumweed	Asteraceae
Hedera helix	English Ivy	Araliaceae
Helenium puberulum	Sneezeweed	Asteraceae
Jaumea carnosa	Jaumea	Asteraceae
Juglans nigra	Black Walnut	Juglandaceae
Lactuca serriola	Prickly Lettuce	Asteraceae
Lepidium latifolium	Peppergrass	Brassicaceae
Leptochloa fascicularis	Sprangletop	Poaceae
Ligustrum sp.	Privet	Oleaceae
Lolium multiflorum	Italian Rye-grass	Poaceae
Ludwigia peploides	Water Primrose	Onagraceae
Malva parviflora	Cheese-weed	Malvaceae
Melilotus alba	White Sweet-Clover	Fabaceae
Mentha arvensis	Mint	Lamiaceae
Mesembryanthemum sp.	Ice Plant	Aizoaceae
Nicotiana glauca	Tree Tobacco	Solanaceae
Paspalum dilatatum	Dallis Grass	Poaceae
Phalaris arundinacea	Reed Canary-grass	Poaceae
Picris echioides	Bristly Ox-Tounge	Asteraceae
Plantago lanceolata	Rib-grass	Plantaginaceae
Platanus racemosa	Western Sycamore	Platanaceae

Scientific Name	Common Name	Family
Poa annua	Annual Bluegrass	Poaceae
Polygonum hydropiperoides	Knotweed	Polygonaceae
Polygonum lapathifolium	Willow Smartweed	Polygonaceae
Polypogon monspeliensis	Rabbit's Foot	Poaceae
Populus fremontii	Fremont Cottonwood	Salicaceae
Raphanus sativus	Wild radish	Brassicaceae
Ricinus communis	Castor Bean	Euphorbiaceae
Rorippa nasturtium-aquatica	Watercress	Brassicaceae
Rubus procera	Himalaya-Berry	Rosaceae
Rumex crispus	Curly Dock	Polygonaceae
Salicornia subterminalis	Pickleweed	Chenopodiaceae
Salix babylonica	Weeping Willow	Salicaceae
Salix hindsiana	Sandbar Willow	Salicaceae
Salix lasiandra	Yellow Willow	Salicaceae
Salix lasiolepis	Arroyo Willow	Salicaceae
Sambucus mexicana	Elderberry	Caprifoliaceae
Sasola kali var. tenuifolia	Russian Thistle	Chenopodiaceae
Scirpus acutis	Common Tule	Cyperaceae
Scirpus californicus	California Bulrush	Cyperaceae
Scirpus olneyi	Olney bulrush	Cyperaceae
Senecio mikaniodes	German Ivy	Asteraceae
Setaria verticillata	Bristly Foxtail	Poaceae
Shinus molle	Pepper-tree	Anacardiaceae
Sida hederacea	Alkali Mallow	Malvaceae
Solanum nodiflorum	Common Nightshade	Solanaceae
Solidago occidentalis	Western Goldenrod	Asteraceae

Scientific Name	Common Name	Family
Sonchus oleraceus	Sow-Thistle	Asteraceae
Typha domingensis	Cattail	Typhaceae
Vinca major	Periwinkle	Apocynaceae
Xanthium strumarium var. canadense	Cocklebur	Asteraceae

APPENDIX L

BIOLOGICAL RESOURCE EVALUATION LAWRENCE EXPRESSWAY TO MILLER AVENUE

VISUAL ASSESSMENT AND BIOLOGICAL SURVEY OF CALABAZAS CREEK

Project No. 2010

prepared for:
Santa Clara Valley Water District
Attn: Dr. Bernard Goldner

by:

Edward C. Beedy, Ph.D.
Susan D. Sanders, Ph.D.
320 West 14th Street
Davis, CA 95616

Virginia Dains
5924 Kenneth Avenue
Fair Oaks, CA 95628

in association with:

Anne Sands, Principal
Riparian Systems
120 Evergreen Avenue
Mill Valley, CA 94941

24 October 1985

CALABAZAS CREEK: VISUAL ASSESSMENT AND BIOLOGICAL SURVEY

TABLE OF CONTENTS

Introduction 1

Visual Assessment 1

Vegetation Survey 11

Wildlife Survey 19

Plant List 25

Wildlife Species List 27

LIST OF FIGURES

Figure 1. Subreach 1B: Lawrence Expressway to Lochinvar Road 7

Figure 2. Subreach 1C: Lawrence Expressway to Lochinvar Road 7

Figure 3. Reach 2: Lochinvar Road to Homestead Road 8

Figure 4. Subreach 3A: Homestead Road to Pruneridge Avenue 8

Figure 5. Subreach 3B: Homestead Road to Pruneridge Avenue 8

Figure 6. Subreach 4A: Pruneridge Avenue to Tantau Avenue 9

Figure 7. Subreach 4B: Pruneridge Avenue to Tantau Avenue 9

Figure 8. Reach 5: Tantau Avenue to Highway 280 10

Figure 9. Reach 6: Stevens Creek Boulevard to Miller Avenue 10

INTRODUCTION

Six reaches of Calabazas Creek extending about two miles from the Lawrence Expressway to Miller Avenue were surveyed on 18 and 19 September and 17 October 1985 to describe the creek's visual qualities, vegetation and value to wildlife. Within this urbanized setting the riparian trees and shrubs growing along this portion of Calabazas Creek are some of the few remnants of natural habitat in the vicinity. Despite their fragmented and degraded condition, parts of Calabazas Creek support a variety of native and non-native plants, and provide feeding and nesting resources to many wildlife species.

VISUAL ASSESSMENT

Reach 1: Lawrence Expressway to Lochinvar Road

Subreach 1A: (approximately 250 feet) This disturbed and relatively unattractive stretch of Calabazas Creek is visible from the the expressway. The creek banks nearest Lawrence Expressway are lined with sack concrete, and concrete rubble from old bank-improvement projects is strewn along the channel. Large trees and shrubs are absent from the banks, leaving power lines on the southern bank unhidden, and vegetation is primarily limited to herbaceous growth in the channel. Beyond the south bank the land is devoted to a residential development. Most landowners have built head-high wooden fences between the maintenance road and their backyards. Upstream some houses have unfenced backyards, and vegetation on the gently sloping southern

bank merges with overgrown backyard trees and shrubs. The opposite bank is a vacant lot with some suburban landscaping.
Subreach 1B: (approximately 960 feet) Most of this densely vegetated subreach resembles a natural riparian setting, with a muddy channel shaded by a canopy of tall oaks and walnut trees. Much of the northern bank is steep-sided, almost vertical in places, and trees here often have undercut and exposed roots. The southern portion is more gradual for most of its length. Brambles and poison oak drape over these steep earthen walls, and both sides of the creek are bordered by plowed cherry orchards. This portion of the creek is less littered by debris than many reaches, but there are still a few shopping carts and sodden mattresses dumped in the channel. The litter does not, however, really detract from the lush and pleasant feel of this subreach.
Subreach 1C: (approximately 475 feet) The view upstream along subreach 1C Avenue is rather unappealing. A large outfall projects from the downstream western bank and stands above a pool of stagnant water. A few feet above the outfall a smaller rusty pipe spans the creek. Just upstream from the pipe and outfall stand two concrete bridge piers, covered with graffiti.

Beyond the edge of the orchards the creek is again bordered by houses, all of which have high fences separating their backyards from the broad maintenance roads on both sides of the creek. Powerlines cut across the channel at the edge of the orchards and run along the east service road. A clump of pines grows on the northern bank but otherwise the road and streambanks are stark except for prunings and lawn clippings that have been dumped into the channel. Near Lochinvar Avenue the banks are concrete-lined and the instream channel is cluttered with concrete rubble from past bank improvement projects.

Reach 2: Lochinvar Road to Homestead Road (approximately 800 feet)

Reach 2 is similar to Subreach 1C in having maintenance roads bordering both sides of the creek and concrete rubble in the channel, but it is less degraded than 1C and presents a more appealing view. The channel is densely vegetated and the banks have considerable shrub cover. Tree cover is relatively sparse except for a stand of oaks on the western bank upstream from Lochinvar Road. Much of the bank has been badly eroded, exposing oak roots, and rocks have been scattered around these roots and along the banks to retard the erosion. Power lines run along the eastern bank, but are not a particularly prominent feature against the landscaped backyards. Most yards are bordered by tall fences. Near Homestead Road, at the upstream portion of the reach, is an orchard remnant and some farm equipment. The channel and maintenance road are relatively unlittered, probably because access to the roads is limited by a locked gate, but there are some garden clippings dumped in the creek channel.

Reach 3: Homestead Road to Pruneridge Avenue

Subreach 3A: (approximately 1,100 feet) Despite the presence of a light industrial complex and its parking lot on the western side of the creek, this subreach is still aesthetically pleasing and parts of it resemble a natural streamside environment. The east side of the creek is flanked by a cherry orchard and a relatively wide band (up to 30 feet) of trees and shrubs borders the orchard. The west bank, however, was recently cleared and is barren except for concrete blocks and patches of brown and dying vegetation. Several 12" outfalls emerge from the gently sloping, eroded western bank. Instream vegetation is very dense and becomes almost impassable near the edge of the orchard where powerlines cut across the creek. The channel is mostly sandy with grasses and cattails interspersed with concrete rubble.

Subreach 3B: (approximately 900 feet) Dense thickets of willows in the streambed and powerlines crossing the creek indicate the beginning of this secluded and attractive subreach. At the downstream, western edge of this subreach part of an industrial complex (Arrowhead Water), its outfall and storm drain (much eroded at their bases) are visible. Upstream, houses border both sides of the creek. Many of the houses have chain-link fences, often covered with ivy or other climbing vines. This fencing offers visual access to landscaped backyards, giving this subreach a more open and expansive feel than the reaches bordered by wooden fencing. At least one landowner has extended his landscaping beyond his own property and has planted iceplant and redwood trees on the eastern streambank. As one progresses upstream the instream vegetation is reduced due to shading by tall oaks and pines. Farther upstream near Pruneridge Avenue concrete rubble and large blocks fill the channel and the creek surroundings are exposed and sunny. Powerlines run along the western bank but are relatively inconspicuous along most of the subreach due to the skyline of tall trees. A locked gate at

Pruneridge Avenue limits access to this subreach.

Reach 4: Pruneridge Avenue to Tantau Avenue

Subreach 4A: (approximately 1,150 feet) Like subreach 3B, this portion of the creek is bordered by houses with well-developed landscaping growing up around chain-link fencing. The southern bank is densely vegetated with mature trees and shrubs that shield the views of adjacent houses. The northern bank has fewer trees to block the views of houses and powerlines bordering the creek. Powerlines run along both sides of the creek, and cross it twice. Rubble and rip-rap from bank improvement projects are sparsely scattered along the stream banks and channel. There are comparatively few signs of erosion here. Instream vegetation is limited due to the shading of tall trees.

Subreach 4B: (approximately 375 feet) Both sides of the creek are bordered by light industrial development and parking lots. The few scattered trees and sparse ground cover do not block the views of nearby buildings. The channel is clogged with concrete rubble from bank stabilazation projects and both banks are entirely lined with rip-rap.

Reach 5: Tantau Avenue to Highway 280 (approximately 1,075 feet)

Except for some cattails growing within the channel, this reach gives the impression of a stark and highly eroded ditch. The banks are steep-sided and almost vertical in places, especially at the downstream end of the west bank. On either side of the creek are broad gravelled borders and paved parking lots. The borders are mostly bare except for a few scattered shrubs and an even row of young redwood trees on the north side.

This sparse vegetation does little to block the views of adjacent light industrial development and parking lots.

Reach 6: Highway 280 to Vallco Parkway: (approximately 760 feet) This reach is not described because it is not part of the project.

Reach 7: Vallco Parkway to Stevens Creek Boulevard: (approximately 750 feet) This underground segment of the creek was not surveyed.

Reach 8: Stevens Creek Boulevard to Miller Avenue (approximately 975 feet)

This stretch is one of the least attractive and most disturbed of the six reaches we surveyed. The streambed is littered with concrete rubble, garden clippings and other debris. Powerlines run along the west bank and cross the creek several times. The east bank is bordered by apartment buildings and condominiums, some of which are two-storied and overlook the creek, as well as light industrial development enclosed by chain-link fences. The west bank is bordered by residential development and wooden backyard fences. Some banks are densely vegetated by brambles, but downstream near Stevens Creek Boulevard they are mostly lined with sack concrete. The banks have undergone substantial erosion, leaving some of the banks steep-sided with exposed tree roots. A few large oaks grow on the upper banks and shade the degraded channel. Access to this portion of the creek is not hampered by a locked gate, and joggers and pedestrians sometimes use the upper banks of the creek.

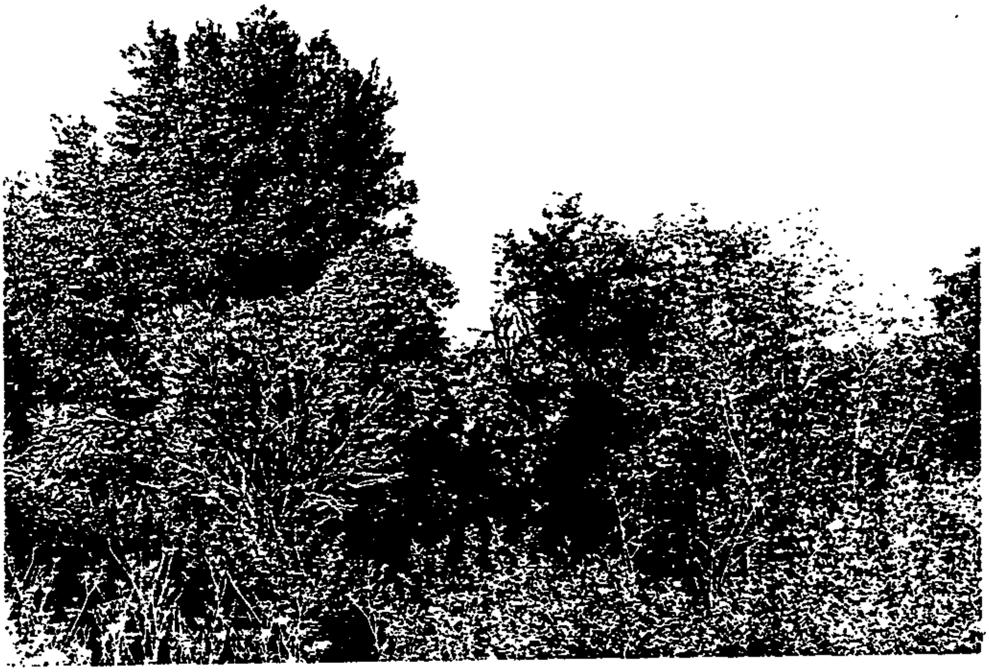


Figure 1. Subreach 1B

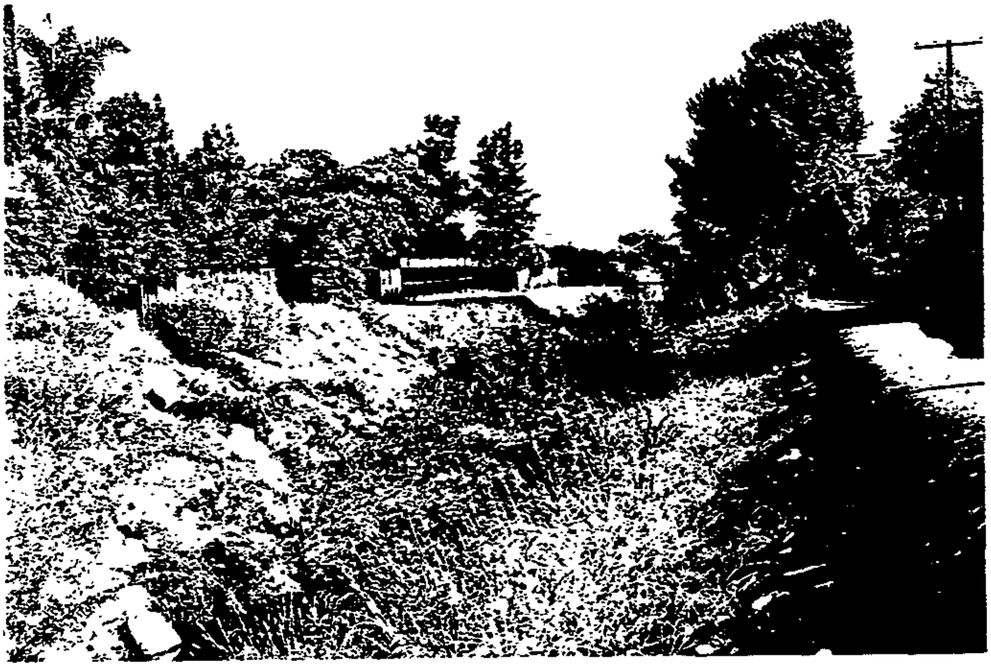


Figure 2. Subreach 1C

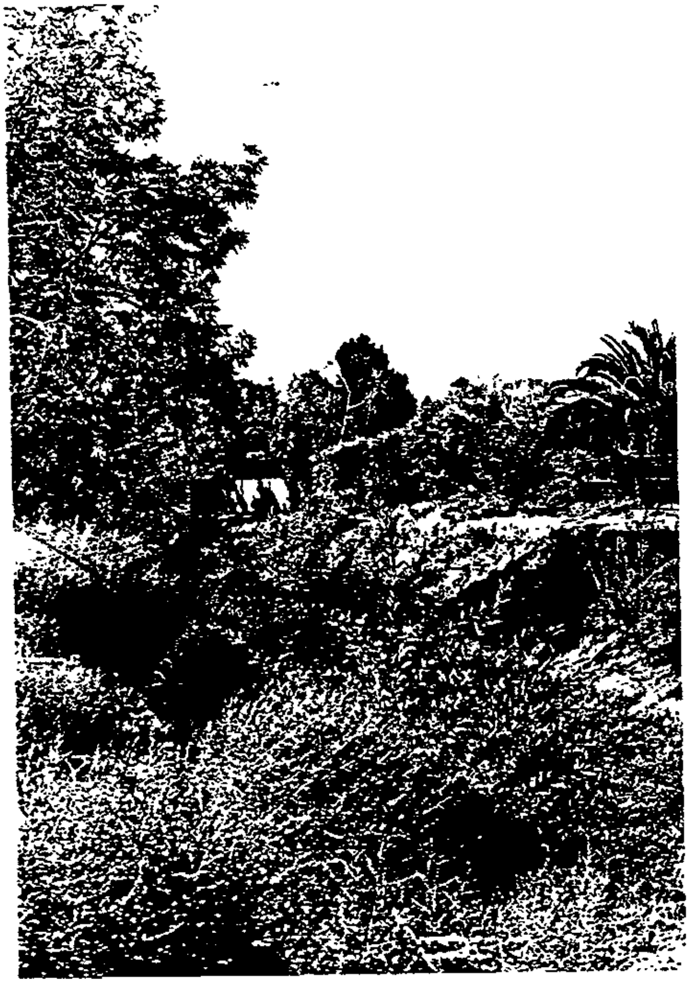


Figure 3. Reach 2: Lochinvar Road to Homestead Road

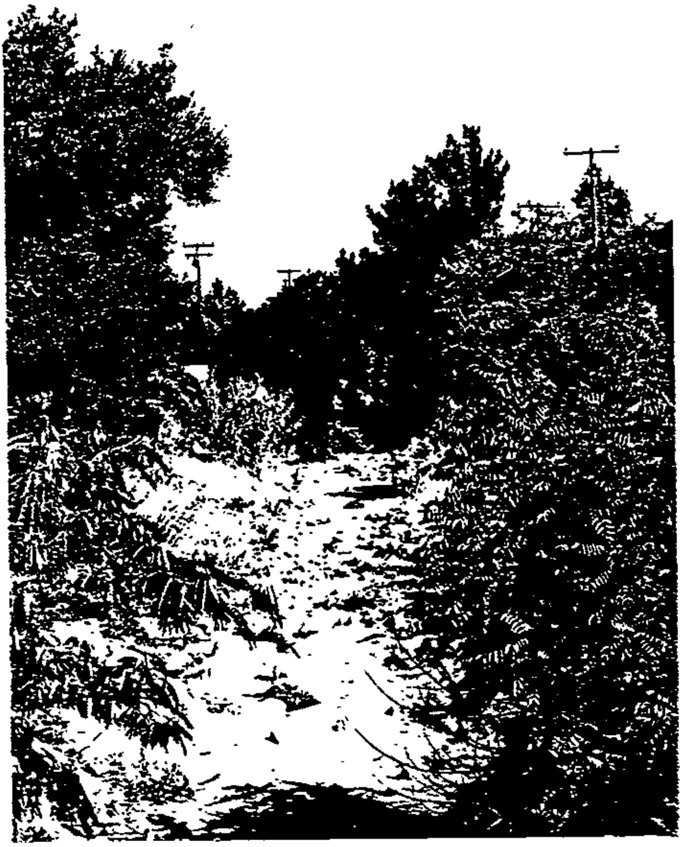


Figure 5. Subreach 3B

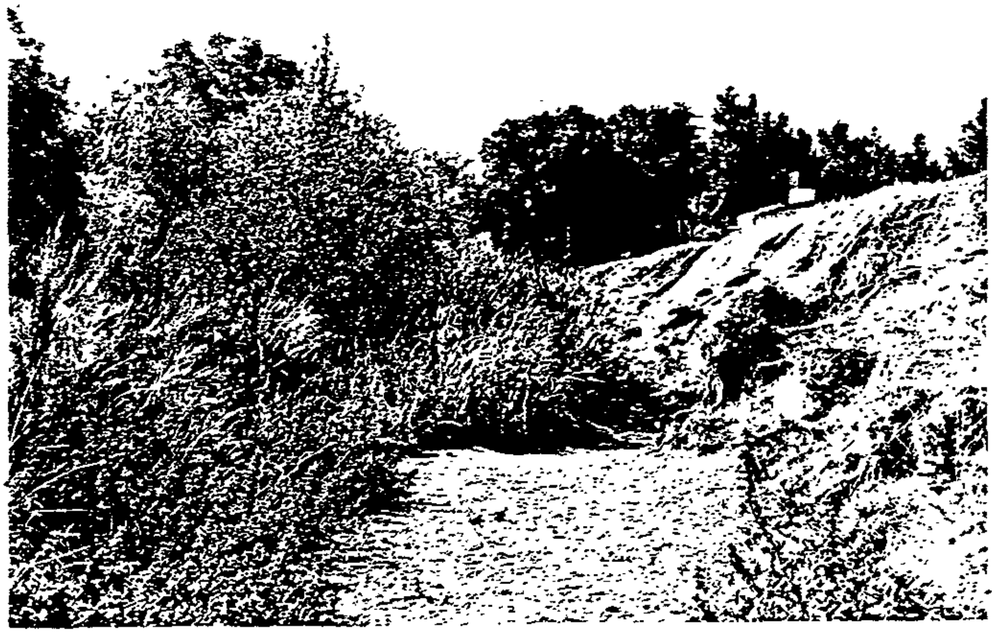


Figure 4. Subreach 3A

Reach 3: Homestead Road to Pruneridge Avenue

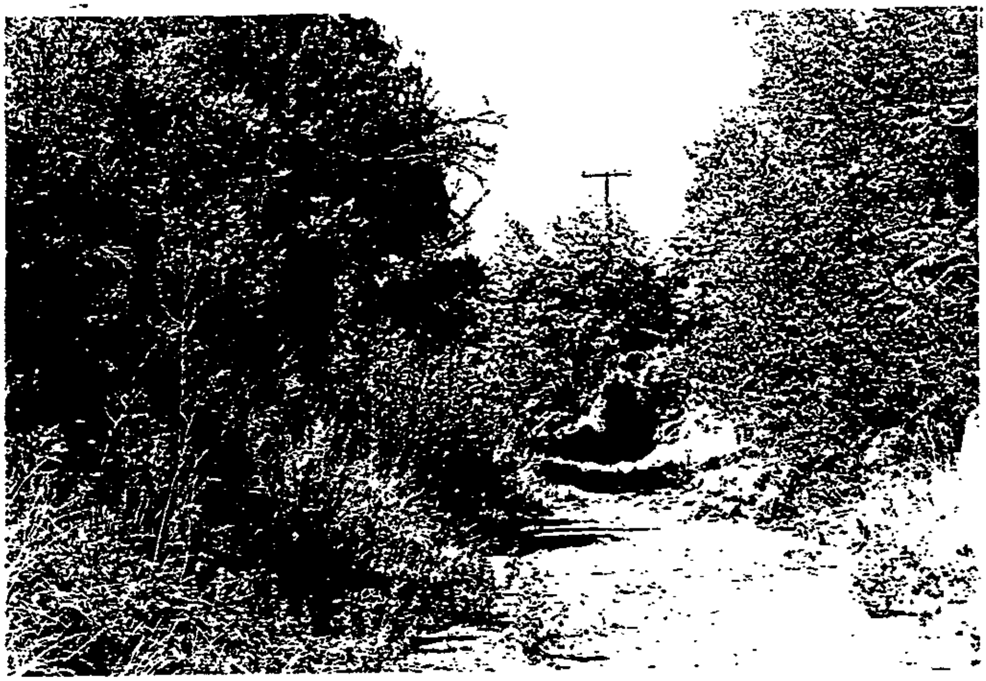


Figure 6. Subreach 4A

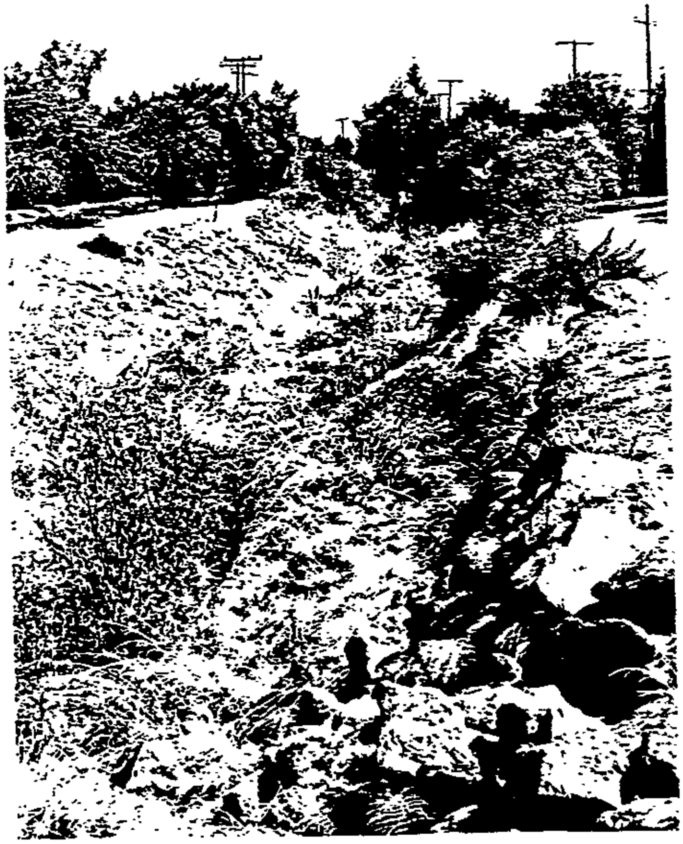


Figure 7. Subreach 4B

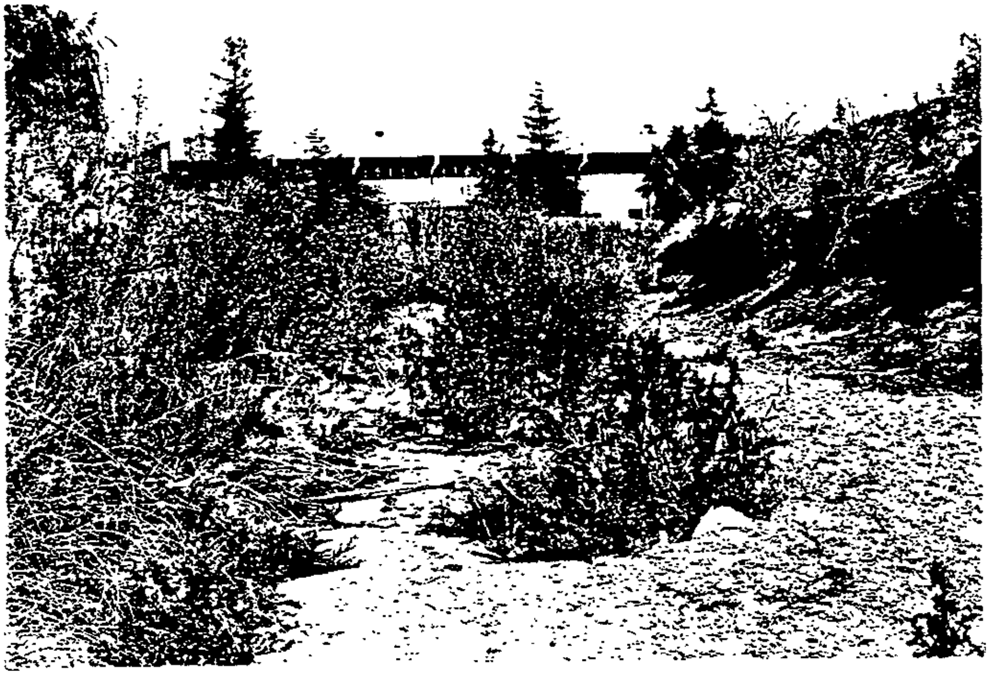


Figure 8. Reach 5: Tantau Avenue to Highway 280

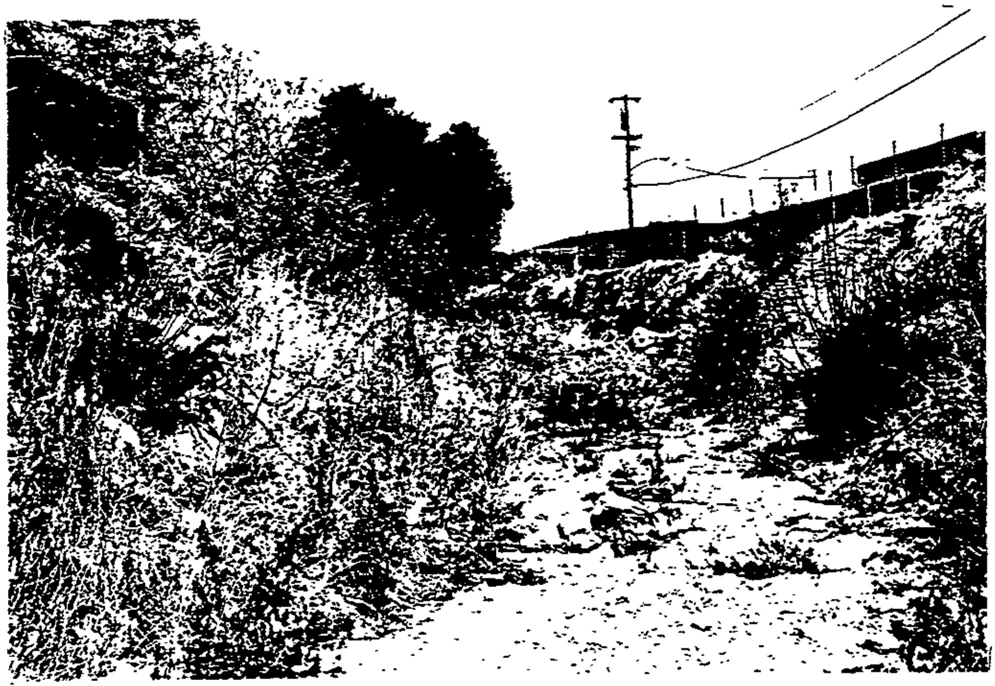


Figure 9. Reach 8: Stevens Creek Boulevard to Miller Avenue

VEGETATION

Methods: For each reach we made a visual survey of the vegetation and compiled a plant species list. Only that portion of the flora readily identifiable during our fall field survey was included. Plant specimens were taken to identify only key taxa; we made no herbarium collections. To compare the vegetation between reaches we have used a variety of ecologial descriptors. These include total stand cover, cover within each physiographic setting (described below), and the age of the stand or key species (given generally as young or mature). These descriptive data are qualitative, derived from the field notes of the project botanist.

Physiographic Settings: Not all of the vegetation along the study reaches is riparian in nature. Thus, we have grouped the vegetation of Calabazas Creek into the three physiographic settings described below.

Instream vegetation is found within the most frequently inundated floodplain or channel bottom; it varies with the amount of summer water present and length of time since the last disturbance (i.e. scouring flood, channel clearing). This vegetation includes many colonizing species of herbs, such as cattail and knotweed, grasses, such as barnyard and Bermuda grass, and several characteristic riparian shrubs and trees. All these plants endure seasonal inundation and disturbance during high flows.

Bank vegetation varies with the history of channel improvement in a given reach. It can be entirely herbaceous or comprised of perrenial vines and shrubs such as English ivy, iceplant, or willow and coyote brush. Some, but not all, of the bank vegetation along Calabazas Creek may rely on streamflow to meet summer water needs.

Peripheral vegetation in most reaches consists of a band of vegetation rooted at or above the creek's banks. This vegetation includes both native trees and horticultural escapes.

Reach 1: Lawrence Expressway to Lochinvar Road

Subreach 1A: The riparian vegetation of this reach is limited to the channel where several species of weedy herbaceous plants have colonized the sandy creekbed. These include barnyard grass, Bermuda grass, knotweed, and horsetail. Upslope and peripheral vegetation consists of annual dry-land grasses and herbs such as fescue and star thistle. A single large elderberry shrub with trunks five inches in diameter grows at the top of the southern bank. Overall cover in this reach is low, with no mature standing trees or clones of riparian shrubs.

Subreach 1B: The vegetation along this reach is a complex mosaic of types within the three physiographic settings. The density and variety of vegetation and the notable absence of many horticultural plants makes this reach most similar to what we would expect in a natural streamside environment. Overall vegetative cover is higher than other reaches, and it is comprised largely of arroyo and smooth willow, two distinctive components of California's lowland riparian communities.

Along the periphery of the creek, mature and sapling coastal live oaks are found. A single mature valley oak that has had its root crown exposed by erosion marks the upstream end. Several elderberry plants exceeding 15 feet in height and spreading 20 or more feet in diameter grow in association with horse chestnut and black walnut.

Bank vegetation is dominated by mixed clumps of arroyo and smooth willow, and occasional individuals of the introduced weeping willow. A few mature willows bordering the creek are tree-sized. The willows alternate with shorter thickets of coyote brush and poison oak. This dense canopy shades much of the creekbed and limits the growth of instream herbs. A few battered stringers of shrubby willows grow within an otherwise sparsely vegetated active channel.

Subreach 1C: The peripheral vegetation flanking this reach is predominantely residential landscaping growing beyond a service road. Bank vegetation is herbaceous, comprised of horsetail and brambles and some dry-site herbs such as tumbleweed that grow well above the influence of the creek. The instream community consists of some common riparian herbs, including mule fat and seep-willow, along with several disturbance-following species like anise, cocklebur, and Bermuda grass. Cattails have colonized areas of standing water, and a few shrubby willows have found suitable habitat bordering these wetter sites. Sandbar willows form the single most continuous patch of riparian shrubs near the upstream end of the subreach. Overall cover in this subreach is high for instream vegetation and low for upslope shrubs and trees.

Reach 2: Lochinvar Road to Homestead Road

Towards the middle of this reach a group of 13 mature coastal live oaks form a closed canopy over the stream. The roots of these trees have been undercut and exposed by erosion, leaving the trees somewhat precariously perched above the creek's banks. Two mature black walnuts and ornamental coast redwoods add to the otherwise sparse cover of peripheral plants. A narrow band of head-high arroyo willows runs along the base of the streambank for 30 to 40 yards and a low thicket of redscale saltbush covers a small portion of the upstream bank. Instream vegetation is dominated by horsetails. Overall cover in this reach is high for instream herbs and medium for upslope shrubs and trees.

Reach 3: Homestead Road to Pruneridge Avenue

Subreach 3A: The west bank of this subreach runs behind a commercial building and was recently cleared of all vegetation. The opposite bank, however, supports clumps of arroyo, smooth, and black willows. Some of these spread 20 or more feet from the border of the creekbed to the top of the bank and their rounded crowns rise upwards to 30 feet. Both smooth and black willows can grow to 45 feet in height and are the dominant riparian trees along many small or intermittent streams in northern California's interior valleys. Patches of coyote brush and poison oak alternate with patches of herbs and flank much of the remaining streambank. A few mature coastal live oaks, elderberries, horse chestnuts, walnuts, and almonds are strung along the willows and other shrubs. The instream community consists of Pacific bentgrass, dallis grass, and other common wet-site herbs. Clumps of cattail and umbrella sedge occur where water is near the soil surface.

Overall vegetative cover is medium. It is comprised mostly of native willows, with coyote brush exhibiting subdominance within the reach. Tree cover is low. Instream herbs are dense where shrub cover has been removed from the areas immediately upslope.

Subreach 3B: A dense stand of vegetation marks the boundary between subreaches 3A and 3B. Willow cover is nearly continuous across the stream channel. On the bank above the creek, a mixed canopy of elderberry, oak, horse chestnut, and walnut provide continuous dense cover. Further upstream, the cover in riparian plants is broken by ornamental plantings of Monterey pine and well-established live oaks. Both the pines and oaks grow at the periphery of the creek's corridor and substantially shade the creekbed. The lack of a continuous band of willows bordering the creek or forming stringers within the channel is apparently due to the locally shaded environment. Beneath the trees, a thin herbaceous community of wild oats, ripgut brome, and soft chess is found.

Bank vegetation is denser beyond the ameliorating influence of the tree canopy. Field mustard and bull thistle are noticeable components of the exposed herbaceous community, though viney mats of blackberry and iceplant occur in equal numbers. California bay provides additional cover of subcanopy trees; most of these are rooted well above the active channel. Instream herbaceous cover increases over the exposed portion of the reach.

Overall cover in this subreach is medium. Cover in peripheral trees, in riparian shrubs, and instream herbs is varied over the reach.

Reach 4: Pruneridge Avenue to Tantau Avenue

Subreach 4A: High cover in peripheral trees distinguishes this reach from all others. The southern bank of the creek supports nearly continuous tree cover, while cover along the northern bank of the creek alternates between patches of herbaceous cover and clumps of trees and shrubs. The trees found in this canopy band are largely coastal live oaks, but a variety of horticultural species including blue gum, peppertree, silver wattle, English walnut, cultivated apple, apricot, almond, olive and plum also occur along the subreach. Also found along this subreach are two trees representative of native riparian communities: box elder and California sycamore. An herbaceous community comprised of grasses and forbs is common on the streambanks. Isolated coyote brush and willows provide some shrub cover, though high density thickets of willow both upslope and within the channel are noticeably absent. In contrast to the oak trees in Reach 2, the trees in this subreach have not suffered serious erosion around their roots that would leave them as hazard trees.

Overall cover in this subreach is high for trees and low for shrubs and instream herbs.

Subreach 4B: This upstream reach has limited cover in upslope vegetation. Some coyote brush, elderberries, and an escaped ornamental *Pyracantha* are the only shrubs present in this reach. The instream herb community is represented by dallis grass and knotweed, with a few three to four foot-high willow sprouts becoming established. At the boundary between reaches 4A and 4B, a swarm of Lombardy poplar saplings occurs in the stream channel. Few of these plants are over five feet tall, and most of them had suffered early leaf drop. Overall cover is low for shrubs and trees, medium for instream herbs.

Reach 5: Tantau Avenue to Highway 280 Herbaceous associations are dominant along this reach. A few scattered walnut saplings are present along the stream bank, but their overall cover is low. Two valley oak saplings are rooted along the northern bank near the toe of the slope. Shrub cover is most continuous along the southern bank at the downstream end of the reach. Here a row of coyote brush grows along the top of the steep bank. Additional scattered individual coyote brush and elderberries grow in patches further upstream. An aggregation of horse chestnut and coyote brush is found on the north bank near Highway 280. Only a few large clumps of willow are found bordering the creek. However, several young willows are becoming established in the channel in association with large stands of cattail. The remainder of the upland and instream communities are dominated by grasses and forbes. Overall cover is high for instream and upslope herbs and low for shrubs and trees.

Reach 8: Stevens Creek Boulevard to Miller Avenue

Several large trees rooted at the top of the cut-bank provide most of the patchy cover along this reach. Most notable of these are the few mature valley oaks found near the top of the creek's bank. A mature clone of Lombardy poplar grows just upstream from Stevens Creek Boulevard. A few coastal live oak, almond, elm, elderberry, walnut, horse chestnut, and California bay trees occur individually or in small clumps along the banks. Two very large horse chestnut trees grow above the southern bank. The predominant bank vegetation is blackberry vines, iceplant, English ivy, garden sweet-pea, and disturbed-site herbs such as anise, black mustard, and sow thistle. Instream vegetation is limited to weedy grasses, cocklebur, horsetail, and a clone of escaped ornamental umbrella sedge. There was no standing water during our September survey, thus the lack of wet-site herbs and streamside willows. The few willows found along this reach were short in stature, and do not provide significant streamside cover. Overall cover in this reach is low for instream herbs and riparian shrubs and medium for upslope and peripheral trees.

WILDLIFE

Methods: Six reaches of Calabazas Creek were surveyed to characterize their typical wildlife and to assess their wildlife habitat values. In our surveys we recorded all birds seen or heard along the creek and noted individuals flying overhead. We surveyed mammals by direct observation and by searching for tracks in the mud. The intent of this study was not to compile exhaustive species lists, and observations made at other seasons would certainly reveal additional species. For example, spring surveys are needed to determine the presence of nesting birds. Wildlife species which were not observed during our surveys but which probably occur at other seasons are noted in the wildlife species list at the end of this report.

Reach 1: Lawrence Expressway to Lochinvar Road

Subreach 1A: The low overall cover, lack of extensive riparian vegetation or mature trees make this area poor wildlife habitat. A few species observed in this subreach were Mourning Doves, House Finches, Killdeers, Black Phoebes, and European Starlings. Most species frequenting this subreach probably do their foraging, roosting and nesting in adjacent suburban yards rather than in the bank-improved creek channel.

Subreach 1B: The structural complexity and high species diversity of the vegetation in this subreach make it excellent wildlife habitat. The locked gate and the adjacent orchard also enhance the value of this wildlife resource because disturbance from humans and dogs is minimized. On the shrubby banks of the creek we found Brown Towhees, White-crowned Sparrows and Bewick's Wrens. Bushtits, Chestnut-backed Chickadees, Anna's Hummingbirds and Orange-crowned and Yellow-rumped Warblers foraged in willow trees, elderberries and in the tall oaks. In the mud of the creek bottom was abundant evidence of Raccoon activity, and further searching would probably reveal Opossum and Striped Skunk tracks as well.

The mature oaks, horse chestnuts and walnut trees and the large elderberry plants along the periphery of subreach 1B are very important wildlife resources; the oaks provide acorns for Scrub Jays, woodpeckers, Fox Squirrels and Raccoons, and the elderberries are eaten by many resident and migrating songbirds. These large trees and shrubs are also good nesting and roosting substrate.

The willows, coyote brush and poison oak along the banks of the creek are also useful wildlife habitat because they provide cover and some food (e.g. poison oak berries) to ground-foraging birds. The willows also offer food like buds and bark for species like squirrels and goldfinches, but are more important as cover for other birds.

Subreach 1C: The most important wildlife resource of this subreach is the extensive instream vegetation of willows and cattails that provide cover and nesting habitat for species such as Song Sparrows and Bewick's Wrens. The pine trees at the periphery of this area also offer roosting and nesting substrate for species like Ruby-crowned Kinglets, Scrub Jays, Chestnut-backed Chickadees and Bushtits.

Reach 2: Lochinvar Road to Homestead Road

A cluster of coastal live oaks and a few scattered walnuts and redwoods in the periphery of the creek are important wildlife resources of this reach. Oaks and black walnuts provide food, and all three tree species offer nesting and roosting habitat. The willow and saltbush thickets along the banks also serve as cover and possibly nesting habitat. In the oaks and walnuts we also noted typical backyard birds such as Scrub Jays, House Finches, Northern Mockingbirds and American Robins. We also saw ground-foragers, including Mourning Doves and Brown Towhees, and migrants such as Western Flycatchers. The instream vegetation of this reach is of little value to wildlife because it is dominated by horsetails, a plant of little food or cover value to birds and mammals.

Reach 3: Homestead Road to Pruneridge Avenue

Subreach 3A: The extensive clumps of tall, native willow trees along the eastern bank of this reach are used as cover for species like Western and Dusky Flycatchers, Anna's Hummingbirds, Northern Mockingbirds and Ruby-crowned Kinglets. The oaks, elderberries, walnuts and introduced almond trees scattered among the willows on the bank are sources of food and cover for birds and mammals. White-crowned, Song and Lincoln's Sparrows and other ground-foragers look for seeds and insects among the coyote brush, poison oak and herbs along the streambank, and often venture into the instream vegetation of cattails, sedges and grasses.

The orchard on the east side of the creek is used by Scrub Jays, Mockingbirds and American Crows and is much better adjacent habitat for wildlife than the asphalt lot and buildings on the western bank.

Subreach 3B: The dense stands of oaks, walnuts, horse chestnuts and elderberries on both banks above the creek are important because they provide food and cover for birds and mammals; in these trees we saw Scrub Jays, Bushtits, Northern Mockingbirds, House Finches, Bewick's Wrens and Fox Squirrels. The oaks and pines beyond this stand of trees are also good wildlife habitat. Where this dense canopy of trees is thinner the understory bank vegetation becomes denser and grasses and blackberry brambles grow. This understory produces seeds and berries, and attracts insects for ground-foraging birds and mammals like White-crowned Sparrows, Brown Towhees, Brewer's Blackbirds and Fox Squirrels. Both the tall tree canopy and well-developed understory should be considered significant wildlife resources.

Reach 4: Pruneridge Avenue to Tantau Avenue

Subreach 4A: The oaks along the periphery of this reach make a high, dense canopy on the eastern bank. This continuous layer of trees provides abundant foraging, cover and nesting opportunies for wildlife and should be considered important habitat. Here we saw Lesser Goldfinches and Bushtit flocks foraging in the oak foliage, as well as Western Flycatchers, Western Wood Peewees and Ruby-crowned Kinglets. On the western bank the canopy is less dense and therefore somewhat less useful for wildlife, but the herbs and shrubs that occur under breaks in the canopy are used by ground-foraging species searching for seeds and insects in the understory. Introduced trees such as blue gum, apple, apricot and almond offer food, cover and nesting habitat for many species and opportunistic animals like Scrub Jays, Northern Mockingbirds, American Crows, Raccoons, Fox Squirrels and Opossums make use of of whatever edible fruits and seeds these non-native trees produce. These species also take advantage of available food and cover in the adjacent residential backyards.

Subreach 4B: The limited cover on the banks and periphery of this subreach make it relatively poor wildlife habitat. The instream community of willows and poplar saplings are cover to wildlife, and the elderberries and *Pyracantha* shrubs are used by backyard birds like Northern Mockingbirds, Scrub Jays and American Robins; overall this reach has little in the way of wildlife resources.

Reach 5: Tantau Avenue to Highway 280

The dense patches of instream cattails and willows make this reach appealing to marsh-loving wildlife like Common Yellowthroats and Redwinged Blackbirds. A few scattered patches of shrubs and trees on the north bank of the creek are used for cover by birds like Mourning Doves and Brown Towhees, but to its limited extent this scattered vegetation is inadequate to be considered good wildlife habitat. In addition, parking lots and industrial buildings on either side of the creek detract from the wildlife value of this reach.

Reach 8: Stevens Creek Boulevard to Miller Ave

The dry channel of this reach supports only grasses and weeds and offers little in the way of cover or food to wildlife.

Where the banks are covered with weeds, iceplant, English Ivy, and dense thickets of blackberry brambles, ground-foragers like Brown and Rufous-sided Towhees, Mourning Doves and White-crowned Sparrows seek food and cover. Above the blackberry patches and other bank vegetation are a few large oaks and other isolated trees. The oak, almond, walnut and elderberry trees provide food to wildlife like Scrub Jays, Northern Flickers, Cedar Waxwings, House Finch and Fox Squirrels, and all large trees are used for cover and nesting.

WILDLIFE SPECIES LIST

The following list includes actual and potential occurrences of wildlife species along seven reaches of Calabazas Creek, Santa Clara Co., from the Lawrence Expressway to Miller Avenue. "X" indicates a species actually detected during field surveys of the creek on 18 and 19 September and 17 October 1985; potentially occurring species are also listed below. The bird names and order follow the American Ornithologist's Union Chicklist of North American Birds (1983).

REACH	1A	1B	1C	2	3A	3B	4A	4B	5	6	8	COMMENTS
BIRDS												
Great Blue Heron (*Ardea herodias*)												
Great Egret (*Casmerodius albus*)												
Mallard (*Anas platyrhynchos*)												
Turkey Vulture (*Gymnogyps californianus*)				X								Fly-over
Black-shouldered Kite (*Elanus caeruleus*)												
Sharp-shinned Hawk (*Accipiter striatus*)												
Cooper's Hawk (*A. cooperii*)												
Red-tailed Hawk (*Buteo jamaicensis*)				X	X							Residen
American Kestrel (*Falco sparverius*)						X				X		Residen
Killdeer (*Charadrius vociferus*)	X											Residen
California Gull (*Larus californicus*)										X		Fly ove
Rock Dove (*Columba livia*)		X								X		Introduce
Mourning Dove (*Zenaida macroura*)	X	X	X	X	X	X	X	X	X	X	X	Residen

BIRDS	1A	1B	1C	2	3A	3B	4A	4B	5	6	8	COMMENTS
Common Barn-Owl (*Tyto alba*)												
Great Horned Owl (*Bubo virginianus*)												
Anna's Hummingbird (*Calypte anna*)		X	X	X	X	X	X			X	X	Resident
Rufous Hummingbird (*Selasphorus rufus*)												
Belted Kingfisher (*Ceryle alcyon*)												
Nuttall's Woodpecker (*Picoides nuttallii*)												
Downy Woodpecker (*P. pubescens*)				X	X							Resident
Northern Flicker (*Colaptes auratus*)		X			X							Resident
Western Wood Pewee (*Contopus sordidulus*)							X					Migrant
Western Flycatcher (*Empidonax difficilis*)		X		X	X		X					Migrant
Dusky Flycatcher (*E. oberholseri*)					X							Migrant
Black Phoebe (*Sayornis nigricans*)	X	X		X		X			X	X		Resident
Scrub Jay (*Aphelocoma coerulescens*)		X	X	X	X	X	X			X		Resident
American Crow (*Corvus brachyrhynchos*)		X										Resident
Chestnut-backed Chickadee (*Parus rufescens*)		X	X				X				X	Resident
Bushtit (*Psaltriparus minimus*)	X		X	X		X	X	X				Resident
House Wren (*Troglodytes aedon*)							X				X	

BIRDS	1A	1B	1C	2	3A	3B	4A	4B	5	6	8	COMMEN
Bewick's Wren (*Thryomanes bewickii*)		X	X		X	X	X				X	Residen
White-breasted Nuthatch (*Sitta carolinensis*)												
Ruby-crowned Kinglet (*Regulus calendula*)			X		X							Migrant
American Robin (*Turdus migratorius*)				X			X					
Western Bluebird (*Sialia mexicana*)												
Northern Mockingbird (*Mimus polyglottos*)		X	X	X	X	X				X		Residen
Cedar Waxwing (*Bombycilla cedrorum*)											X	Winter visitor
Loggerhead Shrike (*Lanius ludovicianus*)											X	Residen
European Starling (*Sturnus vulgaris*)	X	X	X	X	X		X					Introduce
Warbling Vireo (*Vireo gilvus*)												
Hutton's Vireo (*V. huttoni*)												
Orange-crowned Warbler (*Vermivora celata*)		X										
Yellow-rumped Warbler (*Dendroica coronata*)					X		X	X				Residen
Common Yellowthroat (*Geothlypis trichas*)									X			Residen
Wilson's Warbler (*Wilsonia pusilla*)												
Western Tanager (*Piranga ludoviciana*)												
Rufous-sided Towhee (*Pipilo erythrophthalmus*)												

BIRDS	1A	1B	1C	2	3A	3B	4A	4B	5	6	8	COMMENTS
Brown Towhee (*P. fuscus*)		X	X	X	X	X	X	X	X	X	X	Resident
Chipping Sparrow (*Spizella passerina*)							X					Migrant
Song Sparrow (*Melospiza melodia*)			X		X							Resident
Lincoln's Sparrow (*M. lincolnii*)					X							Winter visitor
Golden-crowned Sparrow (*Zonotrichia atricapilla*)		X										
White-crowned Sparrow (*Z. leucophrys*)		X		X	X	X		X			X	Winter visitor
Dark-eyed Junco (*Junco hyemalis*)												
Red-winged Blackbird (*Agelaius phoeniceus*)												
Brewer's Blackbird (*Euphagus cyanocephalus*)		X	X		X							Resident
Brown-headed Cowbird (*Molothrus ater*)												
Northern Oriole (*Icterus galbula*)												
Purple Finch (*Carpodacus purpureus*)												
House Finch (*C. mexicanus*)	X	X	X	X	X	X	X	X			X	Resident
Lesser Goldfinch (*Carduelis psaltria*)				X			X					Resident
American Goldfinch (*C. tristis*)			X	X			X					Resident
House Sparrow (*Passer domesticus*)				X			X					Introduced

MAMMALS	1A	1B	1C	2	3A	3B	4A	4B	5	6	8
Virginia Opossum (*Didelphis virginina*)											
Broad-footed Mole (*Scapanus latimanus*)											
Little Brown Myotis (*M. lucifugus*)											
Long-eared Myotis (*M. evotis*)											
California Myotis (*M. californua*)											
Silver-haired Bat (*Lasionycteris noctivagans*)											
Big Brown Bat (*Eptesicus fuscus*)											
Hoary Bat (*Lasiurus cinereus*)											
Pallid Bat (*Antrozous pallidus*)											
Brazilian Free-tailed Bat (*Tadarida brasiliensis*)											
Desert Cottontail (*Sylvilagus audubonii*)											
Black-tailed Hare (*Lepus californicus*)										X	
California Ground Squirrel (*Spermophilus beecheyi*)										X	X
Western Gray Squirrel (*Sciurus griseus*)											
Fox Squirrel (*S. niger*)				X		X					
Botta's Pocket Gopher (*Thomomys bottae*)											

MAMMALS	1A	1B	1C	2	3A	3B	4A	4B	5	6	8
Deer Mouse (*Peromyscus maniculatus*)											
Black Rat (*Rattus rattus*)											
Norway Rat (*R. norvegicus*)											
House Mouse (*Mus musculus*)											
Raccoon (*Procyon lotor*)		X									
Long-tailed Weasel (*Mustela frenata*)											
Striped Skunk (*Mephitis mephitis*)											
Domestic Dog (*Canis familiaris*)											
House cat (*Felis domesticus*)											
REPTILES AND AMPHIBIANS											
Pacific Tree Frog (*Hyla regilla*)											
Western Fence Lizard (*Sceloporus occidentalis*)	X	X	X	X	X	X	X	X	X	X	X

Partial list of plant species from Calabazas Creek, Santa Clara Co., Calif.

Genus	species	sub-specific	Common name	Comments
Acacia	decurrens		silver wattle	ornamental
Acer	negundo	Californica	box elder	native riparian tree
Aesculus	californica		horse chestnut	native
Agrostis	avenacea		pacific bent-grass	wet-site herb
Agrostis	semiverticellata		bent-grass	wet-site grass
Albizia	julibrissia		silk tree	ornamental
Alnus	rhombifolia		white alder	native riparian tree
Anaphalis	margaritacea		pearly everlasting	dry-site herb
Artemesia	douglasiana		mugwort	
Arundo	donax		giant reed	introduced
Atriplex	cf. canescens		saltbush	revegetation plantings
Atriplex	lentiformis		saltbush	revegetation planting
Atriplex	rosea		redscale saltbush	introduced
Avena	barbata		wild oat	introduced grass
Baccharis	douglasii		seep-willow	riparian herb
Baccharis	pilularis	consanguinea	coyote brush	native shrub
Baccharis	pilularis	pilularis	low coyote brush `twin peaks'	revegetation planting
Baccharis	viminea		mule fat	native
Brassica	niger		black mustard	
Bromus	catharticus		rescue grass	introduced weed
Bromus	diandrus		rip-gut brome	introduced
Carpobrotus	sp.		iceplant	ornamental
Castanea	sp.		Chestnut	ornamental
Catalpa	sp.		catalpa	ornamental
Centarium	soltitialis		star thistle	dry-site weed
Cirsium	vulgare		common thistle	dry-site weed
Cotaneaster	divericata		cotaneaster	ornamental
Cynodon	dactylon		bermuda grass	introduced grass
Cyperus	eragrostis		umbrella sedge	instream herb
Cyperus	esculentus		chufa	wet-site weed
Echinochloa	crusgalli		barnyard grass	
Ecris	piciodes		bristly ox-tounge	wet-site herb
Epilobium	paniculatum		willow-herb	upland weed
Equisetum	sp.		horsetail	
Eucalyptus	globulus		blue gum	ornamental
Eucalyptus	polyanthemos		red box	ornamental
Festuca	megalura		annual fescue	dry-site weed
Foeniculum	vulgare		anise	disturbed sites
Fraxinus	latifolia		Oregon ash	native riparian tree
Fraxinus	velutina			
Hedera	helix		English ivy	ornamental
Heteromeles	arbutifolia		toyon	revegetation planting
Juglans	nigra		black walnut	horticultural escape
Juglans	regia		English walnut	horticultural escape
Lathyrus	odorata		garden sweet pea	
Ligustrum	sp.		privet	ornamental
Lolium	perenne		rye-grass	introduced
Malus	sylvestris		common apple	horticultural escape
Marrubium	vulgare		horehound	naturalized ornamental
Melilotus	alba		white sweet clover	

Genus	species	sub-specific	Common name	Comments
Morus	sp.		mulberry	escaped ornamental
Nicotiana	glauca		tree-tobacco	introduced
Olea	europaea		olive	horticultural escape
Opuntia	sp.		nopal, prickly pear	escaped ornamental
Paspalum	dilatatum		Johnson grass	introduced weed
Phalaris	arundinacea		canary reed-grass	introduced
Pinus	radiata		Monterey pine	ornamental
Pistacia	vera		pistachio	horticultural escape
Platanus	racemosa		plane tree, sycamore	native riparian tree
Polygonum	aviculare		knotweed	disturbed site weed
Polypogon	persicaris		lady's thumb	wet-site herb
Populus	niger	italica	Lombardy popular	hybridizes with natives
Prunus	amygdalus		almond	horticultural escape
Prunus	armeniaca		apricot	horticultural escape
Prunus	salicina		Japanese plum	horticultural escape
Pyracantha	sp.		fire thorn	ornamental
Quercus	agrifolia		coastal live oak	native upland tree
Quercus	lobata		valley oak	native upland tree
Raphanus	sativus		field mustard	common weed
Rhamnus	californica		coffee berry	revegetation planting
Rincinus	communis		castor bean	escaped ornamental
Rosa	floribunda		multiflora rose	horticulural escape
Rubus	ursinus		blackberry	possible escapes
Rumex	crispus		curly dock	wet-sites
Salix	babylonica		weeping willow	hybridizes with natives
Salix	hindsiana		sandbar willow	native riparian shrub
Salix	laevigata		smooth willow	native riparian tree
Salix	lasiandra		black willow	native riparian tree
Salix	lasiolepis		arroyo willow	native riparian shrub
Salsola	kali	tenuifolia	tumbleweed	introduced weed
Sambucus	mexicana		elderberry	native
Schinus	af. terebinthifolius		Brazilian pepper tree	ornamental
Sequoia	sempervirens		coast redwood	ornamental plantings
Sida	hederacea		cheese-mallow	dry-site herb
Sonchus	asper		sow-thistle	common weed
Sorghum	halapense		Johnson grass	weed
Symphoricarpos	af. rivularis		snowberry	native shrub
Toxicodendron	diversiloba		poison oak	naitve shrub or vine
Typha	latifolia		cattail	wet-site herb
Ulmus	parvifolia		small-leafed elm	ornamental
Umbellularia	californica		California bay	native tree
Xanthium	strumarium	canadensis	cocklebur	distubed site weed

Par-

TOTAL

APPENDIX M

INVENTORY OF AND PROJECT IMPACT ON EXISTING TREES REACHES 1-8

Station	Bank Location	Description	Likely to be Removed*
Reach 1A			
291+10	East	6″ Redwood	
22	East	12″ Redwood	
35	East	12″ Redwood	
46	East	16″ Redwood	
55	East	18″ Black Oak	
58	East	36″ Redwood Cluster	
65	East	8″ Live Oak	
70	East	10″ Redwood Cluster	
70	East	18″ Blue Elderberry	
79	East	4″ Redwood	
90	East	12″ Live Oak	
95	East	14″ Redwood	
292+05	East	14″ Redwood	
15	East	3-6″ Redwood	
15	East	7″ Live Oak	
25	East	14″ Redwood	
30	East	18″ Willow Cluster	*
37	East	12″ Redwood	
47	East	6″ Redwood	
60	East	14″ Redwood	
Reach 1B			
293+40	West	10″ Willow	*
85	West	6″ Willow	*
294+10	West	8″ Willow	*
35	West	6″ Willow	*
40	West	36″ Walnut Cluster	*
70	West	36″ Live Oak	
295+10	West	36″ Willow Cluster	*
10	West	18″ Willow Cluster	*
20	West	8″ Black Walnut	*
80	West	4″ Willow Cluster	*
80	East	14″ English Walnut	*
296+00	East	10″ Oak	*
10	West	Unknown Cluster	*
10	West	8″ Cherry	*
50	East	36″ Elderberry Cluster	*
75	West	8″ Cherry	*
85	West	14″ Walnut	*
87	West	8″ Cherry	*

---

[1] Trees located in the natural channel adjacent to the proposed bypass channel.

Station	Bank Location	Description	Likely to be Removed*
297+10[1]	East	6″ Unknown	
25	West	8″ Cherry	*
25[1]	East	Willow Cluster	
55	West	8″ Cherry	*
297+70	West	12″ Walnut	*
297+83	West	8″ Cherry	*
298+58	West	8″ Cherry	*
298+65	West	4-8″ Elderberry	
298+85	West	8″ Cherry	*
298+90	West	8″ Cherry	*
299+00[1]	West	3-5″ Willows	
05[1]	West	6″ Willow	
08[1]	West	5″ Willow	
18[1]	West	8″ Willow	
25[1]	East	10″ Live Oak	
30[1]	West	2-5″ Willows	
299+35	West	8″ Cherry	*
299+90	West	12″ Walnut	*
299+95	West	8″ Cherry	*
300+00[1]	West	36″ Live Oak	
00	West	24″ Walnut	
25[1]	East	24″ Live Oak	
50	West	12″ Walnut	*
55[1]	East	36″ Live Oak	
60	West	18″ Walnut	*
90	West	8″ Cherry	*
301+20[1]	East	30″ Live Oak	
40[1]	East	16″ Black Walnut	
70[1]	East	6″ Live Oak	
85[1]	East	6″ Live Oak	
90[1]	East	12″ Black Walnut	
302+30[1]	East	24″ Live Oak	
80	West	8″ Live Oak	
85[1]	East	36″ Live Oak	*
Reach 1C			
304+07	East	10″ Sycamore	
35	East	14″ Alder	
305+05	East	18″ Monterey Pine	
35	East	18″ Monterey Pine	
Reach 2			
309+60	East	24″ Live Oak	*
310+85	West	24″ Live Oak	*
85	West	20″ Live Oak	*
95	West	18″ Live Oak	*
311+15	West	24″ Live Oak	*

---

[1] Trees located in the natural channel adjacent to the proposed bypass channel.

Station	Bank Location	Description	Likely to be Removed*
80	West	14″ Live Oak	*
40	West	14″ Live Oak	*
45	East	3-12″ Live Oak	*
75	West	14″ Live Oak	*
312+75	East	20″ Black Walnut	
313+15	East	20″ Black Walnut	
55	East	B. Walnut Cluster	*
95	West	3-4″ Birch	
314+05	East	B. Walnut Cluster	*
55	East	24″ Pine	
60	West	6″ Walnut	*
75	East	30″ Redwood	
315+15	West	10″ Black Walnut	*
15	West	14″ Black Walnut	*
20	East	10″ Juniper	
55	East	18″ Unknown	
90	West	3-6″ Live Oak	*
95	East	18″ Live Oak	
316+10	West	3-6″ Live Oak	*
Reach 3A			
318+10	West	8″ Black Walnut	*
10	West	4″ Black Walnut	*
10	West	B. Walnut Cluster	*
10	East	6″ Cherry	*
40	East	12″ Walnut	*
85	East	6″ Live Oak	*
319+10	East	14″ Black Walnut	*
30	East	8″ Walnut	*
45	West	20″ Black Walnut	*
45	East	8″ Black Walnut	*
50	West	20″ Black Walnut	*
60	East	Willow Cluster	*
87	East	6″ Black Walnut	*
90	East	8″ Willow	*
320+00	East	8″ Black Walnut	*
05	East	24″ Black Walnut	*
27	East	6″ Willow	*
40	East	6″ Willow	*
50	East	8″ Willow	*
322+27	East	10″ Black Walnut	*
40	East	30″ Willow	*
75	East	6″ Cedar	*
323+15	East	6″ Cedar	*
60	East	Willow Cluster	*
324+25	East	4″ Willow Cluster	*
327+00	East	4″ Unknown Cluster	*

---

[1] Trees located in the natural channel adjacent to the proposed bypass channel.

Station	Bank Location	Description	Likely to be Removed*
60	East	18″ Walnut	*
328+60	West	24″ Live Oak	
60	West	10″ Live Oak	
68	West	6″ Live Oak	
75	West	10″ Live Oak	
85	West	24″ Live Oak	
329+20	West	24″ Black Walnut	
27	West	Buckeye	*
32	East	5″ Walnut	*
35	East	Elderberry Cluster	*
40	West	Elderberry Cluster	*
45	West	Buckeye Cluster	*
50	West	Elderberry Cluster	*
55	East	8″ Chestnut	*
67	West	Elderberry Cluster	*
73	East	Buckeye Cluster	*
73	East	10″ H. Chestnut	*
90	West	Elderberry Cluster	
330+00	East	Willow Cluster	*
Reach 3B			
330+20	East	10″ Elderberry	*
40	East	10″ Live Oak	*
50	East	8″ Live Oak	
55	East	5″ Willow	*
60	East	8″ Willow	*
85	East	30″ Eucalyptus	
331+00	East	30″ Eucalyptus	
15	East	30″ Eucalyptus	
40	East	18″ Cedar	
55	East	14″ Black Pine	
65	East	8″ Buckeye	*
331+80	East	20″ Black Pine	
90	West	18″ Bay Cluster	*
332+10	East	8″ Black Pine	
15	West	12″ Pine	
20	East	30″ Black Pine	
25	West	12″ Pine	
40	West	12″ Oak Cluster	*
45	East	20″ Redwood	
55	East	18″ Redwood	
63	West	12″ Pine	
90	East	30″ Black Pine	
333+15	East	24″ Black Pine	
30	East	24″ Black Pine	
30	West	24″ Live Oak	*
70	West	6″ Live Oak	*
70	East	20″ Black Pine	
75	West	4″ Live Oak	*

Station	Bank Location	Description	Likely to be Removed*
80	West	4″ Live Oak	*
80	West	6″ Live Oak	*
87	West	6″ Live Oak	*
87	East	36″ Black Pine	
92	West	4″ Live Oak	*
95	West	6″ Live Oak	*
334+10	East	36″ Black Pine	
20	West	4″ Live Oak	*
25	West	4″ Live Oak	*
50	East	14″ Peppertree	
72	West	4″ Live Oak	*
75	West	4″ Live Oak	*
80	West	10″ Live Oak	*
335+45	East	8″ Elm	*
60	West	18″ Pine	
90	West	36″ Live Oak	
336+25	East	6″ Pine	
Reach 4			
338+20	East	12″ Peppertree	*
85	West	6″ Ornamental	*
339+05	East	6″ Black Walnut	*
45	East	18″ Black Walnut	*
45	West	12″ Ornamental	*
339+75	East	14″ Live Oak	
75	East	14″ Live Oak	
85	East	12″ Live Oak	
90	East	14″ Live Oak	
90	East	6″ Live Oak	
95	East	14″ Live Oak	
97	East	12″ Live Oak	
340+00	East	8″ Live Oak	
05	East	14″ Live Oak	
20	East	14″ Live Oak	
25	East	18″ Live Oak	
25	West	7″ Live Oak	*
45	East	16″ Live Oak	
60	East	16″ Live Oak	
67	East	20″ Live Oak	
75	East	2 10 Live Oak	
83	East	12″ Live Oak	
90	East	3-10″ Live Oak	
95	West	Willow Cluster	*
341+00	East	18″ Live Oak	
15	East	8″ Live Oak	
30	East	8″ Live Oak	
48	East	36″ Live Oak	
65	East	16″ Live Oak	
90	East	12″ Live Oak	

Station	Bank Location	Description	Likely to be Removed*
342+25	West	6″ Live Oak	*
27	East	18″ Live Oak	
63	East	24″ Live Oak	
80	East	18″ Live Oak	
80	East	14″ Live Oak	
343+15	West	20″ Pepper	*
20	East	14″ Live Oak	
20	East	14″ Live Oak	
35	East	30″ Live Oak	
40	East	14″ Live Oak	
48	East	8″ Live Oak	
95	East	18″ Maple	
344+12	West	8″ Live Oak	*
15	West	8″ Live Oak	*
17	West	10″ Live Oak	*
25	West	2-8″ Live Oak	*
30	West	2-6″ Live Oak	*
30	West	10″ Live Oak	*
65	East	6″ Live Oak	
78	East	10″ Live Oak	
78	East	17″ Live Oak	
78	East	16″ Live Oak	
85	East	10″ Live Oak	
95	East	4-8″ Live Oak	
345+00	East	8″ Live Oak	
05	East	24″ Live Oak	
10	West	10″ Pepper	*
15	East	6″ Live Oak	
20	East	4″ Live Oak	
345+25	East	12″ Live Oak	
40	East	6″ Live Oak	
45	East	6″ Live Oak	
50	West	12″ Black Walnut	*
55	East	18″ Live Oak	
55	East	10″ Live Oak	
60	East	6″ Live Oak	
60	East	10″ Live Oak	
346+23	West	10″ Black Walnut	*
70	West	Willow Cluster	*
347+10	East	30″ Live Oak	
50	East	10″ Eucalyptus	
65	East	14″ Eucalyptus	
80	East	10″ Eucalyptus	
95	East	24″ Eucalyptus	
348+25	West	Acacia Cluster	*
350+30	East	10″ Black Walnut	
50	East	6″ Chestnut	

Reach 5

	Station	Bank Location	Description	Likely to be Removed*
	360+30	East	Elderberry Cluster	*
	361+10	East	4″ Elderberry	*
	30	West	30″ Live Oak	*
	362+40	East	8″ Black Walnut	*
	364+05	West	6″ Chestnut	*
	38	West	6″ Chestnut	*
Reach 8				
	386+70	West	12″ Willow	*
	84	West	Willow Cluster	*
	85	East	6″ Unknown	*
	387+20	East	8″ Live Oak	*
	388+75	West	6″ Poplar	*
	83	West	12″ Poplar	*
	85	West	2-18″ Poplar	*
	95	West	8″ Poplar	*
	389+05	West	2-8″ Poplar	*
	40	West	Elderberry Cluster	*
	390+50	West	24″ Black Oak	*
	65	West	18″ Unknown	*
	391+35	West	18″ Almond	
	392+05	West	14″ Chestnut	*
	30	West	8″ Chestnut	*
	60	West	36″ Palm	
	70	West	10″ Willow	
	85	West	10″ Willow	
	95	West	Willow Cluster	*
	393+55	East	8″ Live Oak	
	90	East	30″ Live Oak	
	394+25	East	2-18″ Live Oak	
	45	East	16″ Black Walnut	
	395+15	West	6″ Black Walnut	*
	396+65	West	6″ Eucalyptus	
	397+30	East	24″ Black Walnut	*
	398+75	East	8″ Eucalyptus	
	85	East	10″ Eucalyptus	
	399+50	East	12″ Eucalyptus	

SUMMARY

Reach	Total Number of Trees in Remaining Right of Way	Number of Trees Likely to be Removed by the Proposed Project	% Removed
1A	22	1	5%
1B	58	31	53%
1C	4	0	0%
2	32	22	69%
3A	45	38	84%
3B	45	21	47%
4	85	23	27%
5	6	6	100%
8	32	20	63%
Total Reaches 1-8	329	162	49%

APPENDIX N

CALABAZAS CREEK
SALT MARSH HARVEST MOUSE SURVEY

HARVEY AND STANLEY ASSOCIATES, INC.

ECOLOGICAL CONSULTANTS • ENVIRONMENTAL PLANNERS • RESOURCE MANAGERS

CALABAZAS CREEK
SALT MARSH HARVEST MOUSE SURVEY

Prepared by

Harvey & Stanley Associates, Inc.

Robert C. Klinger, Project Manager
Chris Cutler, Field Biologist
Syndie Meyer, Field Biologist
Ronald R. Duke, Principal-In-Charge
Dr. Howard S. Shellhammer, Ph.D.

Prepared for

Dr. Bernard Goldner
Santa Clara County Water District

June 28, 1988

File No. 387-01

906 Elizabeth Street • P.O. Drawer E • Alviso, California 95002 • (408) 263-1814

INTRODUCTION

The salt marsh harvest mouse (Reithrodontomys raviventris) is listed as an endangered species by both the U.S. Fish and Wildlife Service and the California Department of Fish and Game. The species, which is composed of two separate subspecies, is endemic to the San Francisco Bay area. The southern subspecies, R. r. raviventris remains in a few isolated locations in the remaining salt marshes of South San Francisco Bay. The northern subspecies, R. r. halicoetes, is somewhat more widespread and is found in the salt and brackish marshes of San Pablo and Suisun Bays. The northern subspecies has a somewhat broader range of physiological tolerances, and while found primarily in pickleweed habitats, it has also been found in brackish marsh dominated by bulrushes and cattail. (Fisler 1965, Shellhammer 1982).

The Santa Clara County Water District is currently in the planning stage of flood control measures for Calabazas Creek. The purpose of this trapping was to determine if salt marsh harvest mice occurred in the vegetation in the channel. The trapping site was located along 1.8 km of Calabazas Creek from it's confluence with Guadalupe Slough to approximately 0.2 km south of where the creek passes under Highway 237 (Figure 1). The creek is tidally influenced, with approximately a 2 - 3 meter fluctuation occurring from Guadalupe Slough to 0.5 km south of Highway 237.

METHODS

Trapping for the salt marsh harvest mouse was conducted from May 9 to June 4, 1988 using Sherman live traps baited with a mixture of peanut butter, oatmeal, and bird seed. Cotton fiber was added to the trap to provide warmth for captured animals.

Trapping was conducted in two separate sessions along the west and east banks of the creek (Figure 2). Trapping along the east bank was done from May 9 - 12 using 140 traps spaced five meters apart for a total of 560 trap nights, while trapping along the west bank was done from June 1 - 4 with 90 traps spaced five meters apart for a total of 450 trap nights. All traps were set above the obvious high tide line in vegetation between 15 and 30 feet away from the creek channel.

The traps were checked within two hours of sunrise. All captured mice were ear-tagged, identified by sex and age, weighed, and then released. Additional measurements were taken from harvest mice to aid in identification.

Vegetation data were collected using point-intercept sampling (Mueller-Dombois and Ellenberg 1974) from a random sample of twenty percent of the traps and at each trap where a mouse was captured. Twenty points were sampled around each trap; the data collected included the plant species at each point and the height of the vegetation around each trap. From these data the relative and absolute percent cover of each plant species and the average depth of the cover was determined.

IDENTIFICATION

Because it is very similar to the widespread and common western harvest mouse (Reithrodontomys megalotis), the salt marsh harvest mouse is difficult to identify in the field. Criteria for identification of salt marsh harvest mice are described by Fisler (1965) and Shellhammer (1984). Criteria used for identifying salt marsh harvest mice in the field during this survey followed Shellhammer (1984); a brief summary of this technique is described below.

Salt marsh harvest mice and western harvest mice are both very small animals, similar in size, shape, overall body coloration, and both have grooved incisors. In general terms, salt marsh harvest mice are animals with fat, blunt, unicolor tails that lack white hairs and are usually placid. They generally are unexcited at capture. Western harvest mice have pointed, narrower, bicolor tails which have white hairs at the tip, and they are usually excited when captured. Additionally, in some portions of the range of the southern form body coloration can sometimes be a helpful identification tool as many animals have reddish bellies. Finally, most salt marsh harvest mice have orange tufts of hair in front of the base of the ear, while most western harvest mice do not.

The most reliable characters are those associated with the diameter, pattern, coloration, and shape of the tail, as well as the tail/body ratio in some parts of the range of the species (Fisler 1965, Shellhammer 1984). Numeric values are assigned to the tail characteristics according to the scheme depicted in Table 1. General behavioral gestalt is helpful since western harvest mice are generally much more active and aggressive. Field notes are taken regarding the physical characteristics of all harvest mice.

Table 1. Traits of the tail used to differentiate between salt marsh and western harvest mice

Trait	Score 0	Score 1	Score 2
Tip of tail	Blunt	Intermediate	Pointed
Pattern of tail	Unicolor	Intermediate	Bicolor
Tail hairs	No white hairs	Few white hairs	Some to many white hairs
Diameter (mm) at 20 mm from body	2.0+	1.9	1.8 or less

Total scores for all tail characters have been effective in differentiating between the two species, especially when used in conjunction with tail/body ratios, coloration of the venter and behavior. When the points are totaled, a score is obtained that ranges from 0-8. Salt marsh harvest mice generally score from 0-3, while western harvest mice typically score in the range of 6-8.

RESULTS

No salt marsh harvest mice were captured in this survey. Captures of small mammals included 46 house mice (Mus musculus), 1 California ground squirrel (Spermophilus beecheyi), and three western harvest mice (Table 2).

Almost 80 % of the mice were captured on the west bank, including the three western harvest mice. The tail scores for the two adult western harvest mice were five and seven; both individuals had long thin tails, whitish underbellies, and were active when handled. The other western harvest mouse we captured had a low tail score, however the interpretation of the score had to be made carefully because the individual was a juvenile. Because tail characteristics can be misleading in juvenile mice, the characteristics we used to determine whether this individual was a western harvest mouse or not was the tail/body ratio (the tail was 20% longer than the body length), the behavior when handled (not placid), and the habitat which the individuals were captured in. In the Alviso area western harvest mice have tails which are longer than their bodies, while salt marsh harvest mice have bodies which are longer than their tails. When handled, salt marsh harvest mice are almost always placid, while western harvest mice are active (Table 3). All three western harvest mice were captured in vegetation dominated by pepper grass, alkali heath, and plant litter; no extensive stands of pickleweed were present.

Because we trapped 15 - 30 feet away from the channel, we did not collect any vegetation samples within the strip of cattails (Typha sp.) or bulrushes (Scirpus robustus) immediately adjacent to the channel. The vegetation in the trapping area was comprised predominantly of pepper grass (Lepidium leporinum). Alkali heath (Frankenia grandifolia), pickleweed (Salicornia virginica), and plant litter occurred in patches along both banks of the channel. The vegetation in the trapping area on the east bank was lower and had fewer species and more bare ground than the west side (Table 4).

Table 2. Captures of small rodents during the spring of 1988 in Calabazas Creek, Santa Clara County, California. Recaptures are noted in parentheses.

Species	Area		Totals
	West Bank	East Bank	
House mice	36(12)	10	46(12)
California ground squirrel	-	1	1
Western harvest mice	3	-	3
Totals	39(12)	11	50(12)

Table 3. Characteristics and tail scores of western harvest mice captured from May 9 - June 4, 1988, at Calabazas Creek, Santa Clara County, California.

I.D. #	Tail Tip	Tail Pattern	Tail Hairs	Tail Diameter	Tail Score	Activity	Venter	Weight (gm)	Tail/ Body Ratio	Sex
788	2	1	1	1.9	5	Active	2	8.0	1.06	m
783	2	2	2	1.9	7	Active	2	11.3*	1.04	f
784	1	1	0	2.0	2	Interm	1	7.2**	1.19	m

* Individual was pregnant

** Juvenile

Table 4. The composition of herbaceous vegetation during the spring of 1988 in Calabazas Creek, Santa Clara County, California. Values are % absolute cover (ac), % relative cover (rc), and % frequency of occurrence (fo), respectively.

Species	Area						Totals		
	West Bank (n=33)			East Bank (n=23)					
	AC	RC	FO	AC	RC	FO	AC	RC	FO
Pickleweed	14.2	15.1	0.39	16.1	20.1	0.52	15.2	17.6	0.4
Pepper Grass	30.0	31.8	0.88	25.2	31.5	0.96	27.6	31.7	0.9
Alkali Heath	21.8	23.1	0.58	16.1	20.1	0.74	19.0	21.6	0.6
Litter	7.6	8.1	0.48	10.2	12.7	0.57	8.9	10.4	0.5
Poison Hemlock	2.0	2.1	0.12	1.1	1.4	0.09	1.6	1.7	0.1
Goldenrod	3.5	3.7	0.15	3.5	4.4	0.22	3.5	4.0	0.1
Sedge	1.8	1.9	0.06	2.3	2.9	0.04	2.1	2.4	0.0
Grass	1.4	1.5	0.09	-	-	-	0.7	0.7	0.0
Dock	3.0	3.2	0.12	-	-	-	1.5	1.6	0.0
Gum Plant	0.8	0.8	0.03	-	-	-	0.4	0.4	0.0
Thistle	2.9	3.1	0.12	-	-	-	1.5	1.5	0.0
Fennel	2.4	2.5	0.12	0.7	0.9	0.04	1.6	1.7	0.0
Ice Plant	3.0	3.2	0.03	-	-	-	1.5	1.6	0.0
Lotus	0.8	0.8	0.03	-	-	-	0.4	0.4	0.0
Jaumea	-	-	-	4.8	6.0	0.13	2.4	3.0	0.0
Bare Ground	5.6		0.24	20.0		0.74	12.8		0.4
Height (cm)	43.1			33.8			38.5		

DISCUSSION

The area in and around Calabazas Creek is inappropriate habitat for salt marsh harvest mice. Dense stands of pickleweed and other halophytes are the preferred habitat of the species (Shellhammer 1982), and there is increasing evidence that grasslands adjacent to pickleweed have seasonal importance as well. The vegetation in Calabazas Creek exists in narrow bands no more than 30 feet wide bordered by steep levees. Although pickleweed and alkali heath are present, they occur only in thin fragments which are frequently interrupted by other species. The surrounding parcels of land are comprised predominantly of grasses, without any extensive stands of pickleweed nearby.

Although salt marsh harvest mice have the capacity to persist in marginal habitats (Shellhammer et al. 1985a and b), the nature of the vegetation within the streambed, land use practices, and the invasion of exotic plants in and around the creek have made the area unlikely to be inhabited by the species. Calabazas Creek is predominantly freshwater, so it is unlikely that pickleweed ever comprised a large part of the vegetation. The species composition of the vegetation has been altered by the invasion of pepper grass, which has resulted in further reducing the cover of pickleweed in the channel. As a result, there is little basis to believe that salt marsh harvest mice presently occur on the site.

LITERATURE CITED

Fisler, G. F. 1965. Adaptation and speciation in harvest mice of the marshes of San Francisco Bay. Univ. Calif. Publ. Zool. 77:1-108.

Mueller - Dombois, D., and H. Ellenberg. 1974. Aims and Methods Of Vegetation Ecology. John Wiley and Sons. 547 pp.

Shellhammer, H. S. 1982. *Reithrodontomys raviventris*. Mammalian Species No. 169. 3pp.

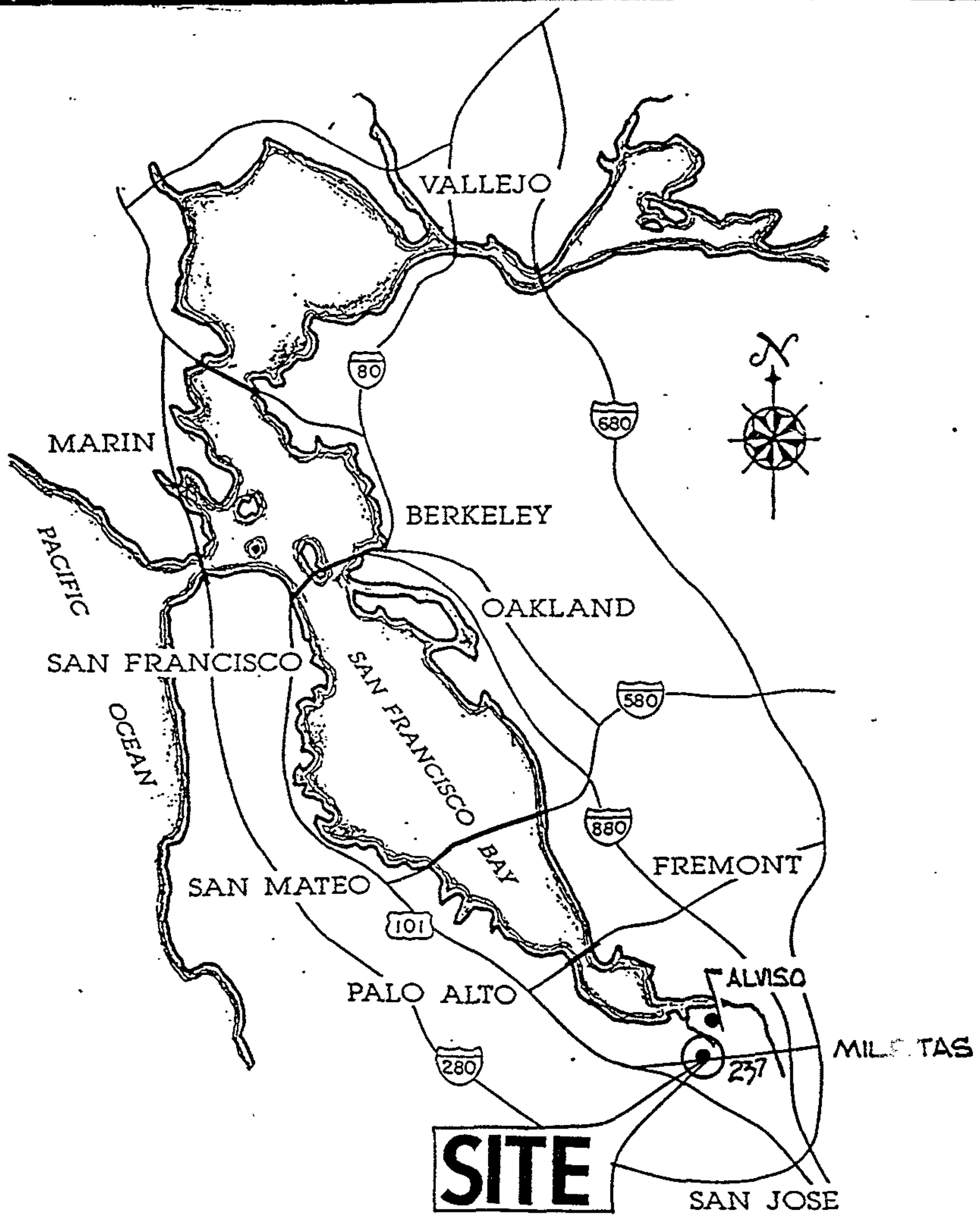
Shellhammer, H. S. 1984. Identification of salt marsh harvest mice, *Reithrodontomys raviventris*, in the field and with cranial characteristics.

Shellhammer, H.S., V. Jennings, V. Johnson, S. Muench, and M. Newcomer. 1985 a. Studies of the salt marsh harvest mouse in marginal and other sites in the South San Francisco Bay, 1983-1985. Report to California Department of Fish & Game.

Shellhammer, H.S., V. Johnson, and R. Johnson. 1985 b. Studies of the salt marsh harvest mouse done as consulting trapping for Harvey & Stanley Associates, Alviso, California. Report to California Department of Fish & Game.

APPENDIX 1. COMMON AND SCIENTIFIC NAMES OF VEGETATION IN SALT HARVEST MOUSE TRAPPING GRIDS IN CALABAZAS CREEK, SANTA CLARA COUN CALIFORNIA.

Pickleweed	*Salicornia virginca*
Pepper Grass	*Lepidium latifolium*
Alkali Heath	*Frankenia grandifolia*
Poison Hemlock	*Conium maculatum*
Golden Rod	*Solidago occidentalis*
Sedge	*Carex* sp.
Grass	*Polypogon monspelieusis*
Dock	*Rumex* sp.
Gum Plant	*Grindelia humilis*
Thistle	*Cirsium? Carduus? Silybum?*
Fennel	*Foeniculum vulgare*
Ice Plant	*Carpobrotus edule*
Bird's Foot Trefoil	*Lotus corniculatus*
Fleshy Jaumea	*Jaumea carnosa*

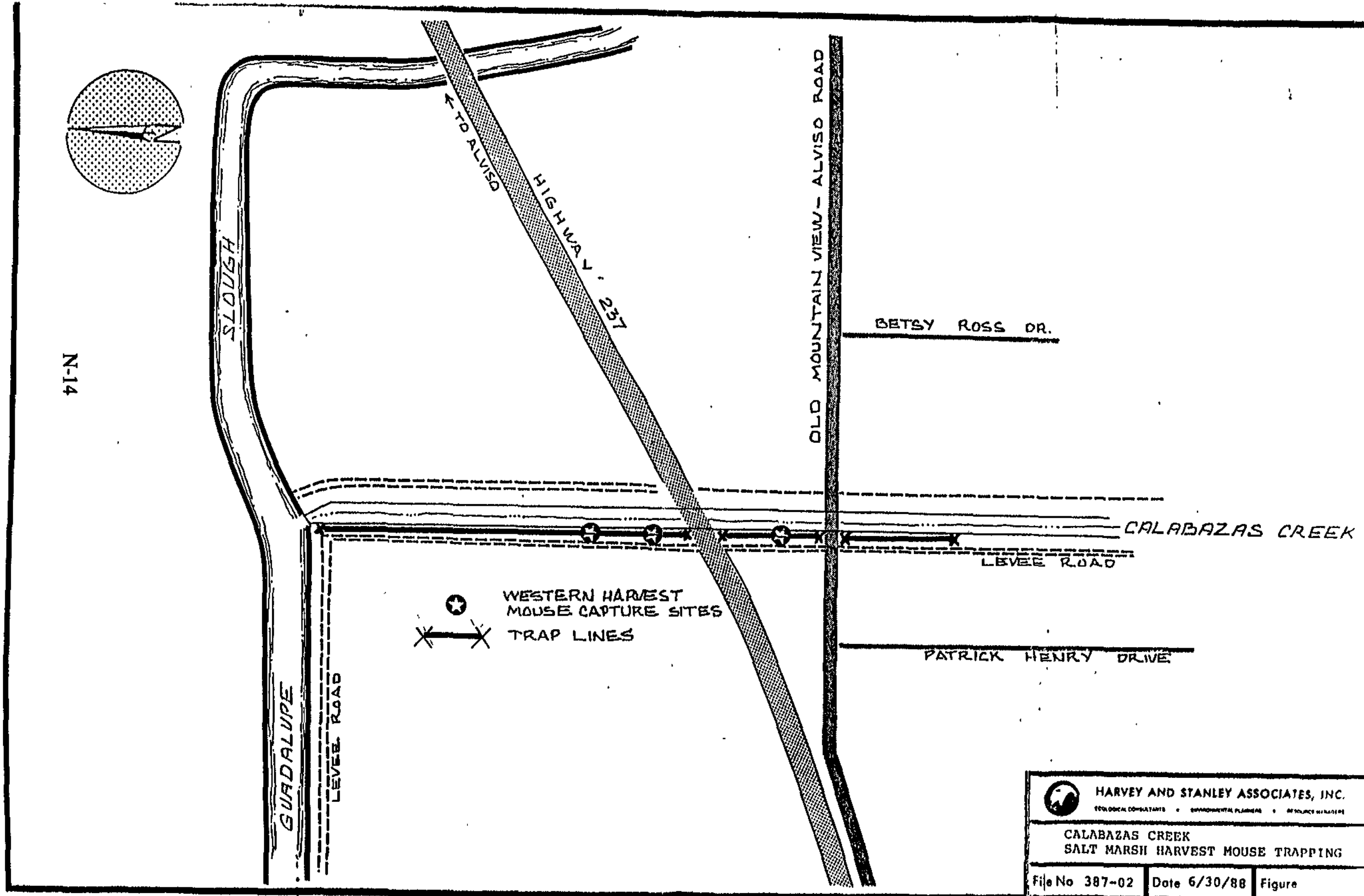


HARVEY AND STANLEY ASSOCIATES, INC.

ECOLOGICAL CONSULTANTS • ENVIRONMENTAL PLANNERS • RESOURCE MANAGERS

CALABAZAS CREEK
VICINITY MAP

File No 387-02	Date 6/30/88	Fig



HARVEY AND STANLEY ASSOCIATES, INC.

CALABAZAS CREEK
SALT MARSH HARVEST MOUSE TRAPPING

File No 387-02 | Date 6/30/88 | Figure

APPENDIX O

FISHERY ASSESSMENT HIGHWAY 101 TO GUADALUPE SLOUGH

THE HABITAT RESTORATION GROUP

JOHN STANLEY & ASSOCIATES

6001 BUTLER LANE, SUITE #1
SCOTTS VALLEY, CA 95066
(408) 438-4102

CALABAZAS CREEK PLANNING STUDY
HIGHWAY 101 TO GUADALUPE SLOUGH
FISHERY ASSESSMENT

Prepared by

JOHN STANLEY AND ASSOCIATES, INC.

Principal Investigator

Donald Alley, Aquatic and Fishery Biologist

Field Investigators

Colleen Pelles
Stafford Lehr
David Lonzarich

Prepared for

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

May 3, 1989 File No. 387-03

CALABAZAS CREEK PLANNING STUDY
HIGHWAY 101 TO GUADALUPE SLOUGH
FISHERY ASSESSMENT

Prepared by

THE HABITAT RESTORATION GROUP/
JOHN STANLEY AND ASSOCIATES, INC.

Prepared for

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

August 30, 1989

File No. 387-03

History of Channel Maintenance

The section of Calabazas Creek from Highway 101 downstream to Guadalupe Slough has been a man-made flood control channel along the present channel alignment since 1958. Before flood control projects began in the South Bay, all of the creeks in the area had been cut off from the Bay by Leslie Salt Company. The channel was reconstructed to the existing design in 1979 and was not designed to permit substantial vegetative growth within the channel or on the in-board side of the levees. Maintenance has been performed periodically to remove vegetation and sediments. After maintenance activity, the channel would aggrade and revegetate. Maintenance efforts have not been completely effective in keeping the channel free of vegetation due to budgetary limitations. In response to concern about the increased potential for flooding after high flows in 1986, the Santa Clara Valley Water District indicated that the channel will be maintained more rigorously at the design specifications in the future.

Since 1979, extensive drag line excavation was carried out in 1986 downstream of Highway 237 (Reach 9) and 1987 upstream of Highway 237 to Old Mountain View-Alviso Road (Reach 10) to remove sediment and vegetation (Jeff Micko, Santa Clara Valley Water District, personal communication). Since the existing project began in 1979, the clearing of riparian trees has occurred in 1981, 1983, 1984, and 1988 for willows only between Old Mountain View-Alviso Road and Tasman Drive (Reach 11) and Tasman Drive to Highway 101 (Reach 12). The clearing was followed by application of Rodeo herbicide to root stumps. Upstream of Tasman Drive, a well developed riparian corridor of willows and alders had returned by summer, 1988. Willows were 20 to 30 feet tall on both sides of the low flow channel with alders being generally larger, with some alders reaching 8 inches in diameter at breast height as a result of colonizing the area since 1979. However, the absence of trees downstream of Highway 101 for several hundred yards and on the eastern levee slope for the entire extent of the project area in July, 1988 was an indication of ongoing maintenance. In August and September, 1988, all woody vegetation and nearly all flexible vegetation was excavated in Reach 12. In Reach 11 since 1979, periodic sediment and non-woody vegetation removal on the east side of the channel (1984, 1985, 1986 and May, 1988) created a second low flow channel which was inundated at high tide in the tidally influenced portion of the stream. This transitory eastern low flow channel was separated from the main low flow channel by a vegetated berm. The main, western low flow channel was permanent and required little or no dredging (Jeff Micko, personal communication). In Reach 12 since 1979, silt and non-woody vegetation removal occurred in 1981, 1983, 1986 and 1988. Non-woody vegetation was removed from Reaches 11 and 12 on both sides of the low flow channel, but in alternating years with only one side cleared each of the aforementioned years.

Between the time of our first field reconnaissance on August 11 and fish sampling of the freshwater reach on August 30, 1988, maintenance had begun upstream of Tasman Drive under permit from the Department of Fish and Game. By September 29, 1988, the last date of our field observations, all riparian vegetation, including root material, had been excavated from the east levee across the flood control channel to the east margin of the low flow channel, which was located adjacent to the west levee slope. Vegetation was untouched to date on the west margin of the low flow channel. Some vegetation on the west levee slope had been removed. The streambed did not appear to be disturbed to date.

Frequency of Projected Maintenance Under the No Project Alternative (Existing Maintenance Program)

The need for periodic maintenance will vary according to the frequency of storm events which will carry sediment down into the project area to be deposited primarily within the first 1500 feet below Highway 101 or to be carried beyond the project area to be deposited within the tidally influenced area by tidal action. The amount of tree growth and channel sedimentation that occurred in the past, creating valuable habitat, will not be permitted in the future.

It is anticipated that in Reach 9 the low flow channel will require restoration to the design capacity by excavation of each side every third year with emergent vegetation being removed from either side in alternating years. Excavation will be done with a drag line working the bucket on one half the channel one year and the other half of the channel the next year, resulting in excavation of the low flow channel and bench area. In Reaches 10 and 11 the maintenance practices and frequencies will be the same as in Reach 9. In the upper 1300 feet of Reach 11, a center berm will be preserved because the drag line will not extend out into the channel as far as the center area. In Reach 12 it will be necessary to remove sediment and all vegetation every year from the low flow channel and its margin, alternating maintenance on each side every other year. The sediment bench on the east will require excavation every 4 years while vegetation will be removed or flattened every 2 years.

Anticipated Frequency of Maintenance Under the Proposed Project

As mentioned in the previous section, maintenance frequency will depend on the frequency of large storm events. These events determine the amount of sediment transport into and beyond the project area. For Reach 9 it is anticipated that with the increased channel capacity, channel maintenance will be less frequent, occurring at an interval of 5-10 years, if at all. Channel maintenance will include removal of vegetation and sediment from the low flow channel and adjacent terrestrial habitat area. The low flow channel will be excavated from the nearest maintenance road to restore the channel's design capacity. Some emergent vegetation will probably remain on the opposite side of the low flow channel. The sediment bench in the terrestrial habitat area will be excavated only if it aggrades above 7 feet elevation. It is expected that an equilibrium point will be reached at 6 feet elevation or less and excavation will be unnecessary. Because the bench will slope down toward the low flow channel, some emergent vegetation will remain after bench excavation down to 5 feet elevation.

Reach 10 will experience the same maintenance practices and frequency as Reach 9.

In Reach 11, it is anticipated that sediment and non-woody plant removal from the low flow channel will be required every 3-6 years. Vegetation will be removed along with the low flow channel adjacent to the nearest maintenance road and a portion of the other bank to meet width criteria for vegetation encroachment. It is anticipated that the remainder of emergent and other flexible vegetation on the opposite side of the maintenance access and on the bench will be left undisturbed. In the upper 1300 feet of the reach an island will be formed with a double channel should any excavation of the bench ever be required. All woody vegetation will be removed probably every 2-3 years in Reach 11 when it reaches 8 feet in height. In Reach 12, excavation of sediment and removal of woody and non-woody vegetation will be necessary in the low flow channel every 2 years on the opposite side of the designated, wooded green belt that would provide terrestrial habitat.

It is anticipated that sediment on the eastern bench will require excavation every 4 years with removal or flattening of vegetation every 2 years. A riparian green belt will be allowed to develop on the western side of the low flow channel in an area 8 feet out from the toe of the levee slope and on the levee slope and branches of trees will be allowed to overhang the stream. The maintenance equipment will excavate only the sediment in the channel beneath the overhanging branches. The tree canopy will be allowed to develop fully from the green belt corridor on the west side of the low flow channel.

Existing Aquatic Habitat Conditions Before August, 1988

The following is a description of existing conditions before the channel maintenance of August and September, 1988, based on field observations on August 11, 1988. The low flow conditions after two years of drought possibly failed to give a full picture of the stream's potential in wetter years. In wetter years there would be more freshwater habitat and the tidally influenced section would be less saline, making it more tolerable for predominantly freshwater fish species. This year's conditions do represent conditions which would limit the long term sizes of fish populations in the stream.

Reaches 9 and 10. Old Mountain View-Alviso Road Downstream to Guadalupe Slough (approximately 2060 feet).

Between Old Mountain View-Alviso Road and Highway 237 (Reach 10), a distance of approximately 420 feet, no riparian trees were present, with tules inhabiting mainly the west bank at heights of 3-8 feet and averaging about 5 feet. They became thicker at the upstream portion of the reach, offering good cover there.

From Highway 237 downstream to Guadalupe Slough (Reach 9), a distance of approximately 1640 feet, no trees existed presumably due to high salinities, with tules lining the creek margin with borders 6 to 15 feet wide and averaging 8 feet upstream of the pump station. Tules were thicker on the east side. They averaged about 8 feet in height upstream of the pump station where the channel width ranged between 20 and 25 feet from one tule margin to the other. Downstream of the pump station there was evidence of tule clearing, with tules ranging from 2 to 7 feet high and averaging about 6 feet. The tule margin was 6-8 feet on either side of the channel. The channel width there ranged between approximately 25 and 30 feet, averaging a fairly uniform 25 feet at high tide of 6+ feet on September 3, 1988. Channel width declined to about 6 feet in width at low tide on September 4. At high tide the channel margins extended approximately 6 feet horizontally into the tules, offering good fish cover up and downstream of the pump station.

Approximately 0.14 miles below Highway 237 was a pump station operated by the City of Sunnyvale to pump water from a pond on the west into Calabazas Creek. The pond collects storm drain runoff in winter. It may be subject to tidal action or seepage because the pumps were working in early September. As indicated by salinity measurements taken in the creek up and downstream of the pump station during pumping and at a flood tide, the water from the pond did not appear to change the salinity of the Creek (Table 2). Salinity was not measured in the pond itself. Salinity increased from a fairly uniform 2.6 ppt just as the tide began to come in to a fairly uniform 9.9 ppt at flood tide (Table 2). Oxygen levels declined significantly from a fairly uniform water column dissolved oxygen concentration that averaged 15.4 ppm at 1508 hr in the afternoon as the tide began to come in to a fairly uniform average of 4.3 ppm at 0827 hr the next morning.

Stevenson et al. (1987) measured salinity at 4 upper Guadalupe Slough stations 1981-1985, indicating moderate to low salinity conditions. The average for November through April ranged from 1.7 to 3.7 ppt while the average for May through October ranged from 1.3 to 3.6 ppt. The maximum salinity ranged from 8.9 to 12.0 over the four year period. Freshwater effluent from South Bay dischargers travels west to apparently produce low salinities in Guadalupe Slough even in the dry summer months.

Reach 11. Tasman Drive Downstream to Old Mt. View-Alviso Road (approximately 2640 feet).

Between Tasman Drive and Old Mountain View-Alviso Road the riparian tree corridor was less continuous than above Tasman Drive, with approximately 45% (1190 feet) of the half- mile section bordered by trees on at least one side and 95% of the trees existing on the center island of the channel. Where trees existed, there was also a 5-6 foot wide belt of tules bordering the stream. The trees were outside the tule border and further from the stream in most cases. The remaining 55% (1450 feet) of the channel was bordered by bulrush and cat-tails. The lower 530 feet of the reach was treeless. The island was tidally breached in the lower portion of the reach, creating a split channel at high tide on either side of the center island throughout the reach. No trees were present on the east levee slope.

Trees provided stream shading ranging from 5 to 20%, averaging about 10% where trees were present. Mostly rushes and fewer cat-tails thickly lined the low flow channel, ranging from 6 to 10 feet in height and averaging about 8 feet. They provided about 10 to 20 % shade in the slough-like habitat, averaging about 10%. At a high tide of 6.7 feet, on September 2, 1988, the channel averaged about 12 feet in width on either side of the berm and at low tide about 3 feet in width on the west side of the berm. In places the tules encroached on the channel to reduce the channel width to about 4 feet at high tide. As the tide came in, a maximum depth of 1.5 meters was measured with a maximum salinity of 7.6 ppt at the bottom (Table 1). As low tide approached on September 3, 1988, depth was measured at 0.2 meters and salinity declined to 1.0 ppt at the bottom (Table 1). Oxygen levels near the bottom declined significantly from 7.2 ppm to 2.4 ppm with the incoming tide in late afternoon (Table 1).

Reach 12. Highway 101 Downstream to Tasman Drive (approximately 5280 feet)

Streamflow was approximately 2 cfs at Highway 101 on August 11, 1988, which resulted from a gradual increase in flow from just a trickle at Benton Street, upstream of El Camino Real. By September 29, 1988, streamflow had declined to about 1 cfs. The stream flowed throughout the summer of extended drought in 1988 due, exclusively, to storm drain runoff. Downstream of Highway 101, no riparian trees were present for approximately 2430 feet, the stream being bordered by cat-tails and bulrushes and overhanging vegetation such as dock. This must have been an area of clearing in the recent past. Fish cover was excellent along stream margins from overhanging herbs, cat-tails, bulrushes and grasses that provided 40-60% shading, averaging 50%. Downstream for the next approximately 2850 feet to Tasman Drive, riparian trees consisting of mostly willows with some cottonwoods, alders, eucalyptus and patches of giant reed shaded the stream between 10 and 80%, averaging 25%. These trees along with overhanging herbs, rushes and cat-tails provided good fish escape cover. Trees ranged from 20 to 40 feet in height with diameters at breast height between 2 and 10 inches. The creek was tidally influenced upstream of Tasman Drive about 1580 feet into the riparian corridor, leaving approximately 3700 feet upstream as freshwater, depending on how high the tide was.

Trees occupied a 20 to 40 foot wide corridor on an island in the center of the flood control channel, with the low flow channel between the island and west levee slope, which also had riparian trees. Where trees existed, they were abundant enough to shade out most tules that would have otherwise bordered the stream. No trees existed on the east levee slope or in the eastern channel, which must have been formed by past dredging. The low flow channel width ranged from 5 to 9 feet, averaging 7 feet in the treeless section and ranged from 9 to 25 feet in the tree-lined section , averaging 10 feet in the freshwater section and about 15 feet in the tidally influenced section.

The streambed and levee slope were earthen. The treeless section consisted of 100% run and glide habitat with 60% of the substrate as fines, less than 1/4 inch, and 40% gravel between 1/4 and one inch in diameter. Salmonid spawning gravel was present. The tree-lined section was 70% pool due to tidal influence, 20% run and 5% riffle. Pool substrate in the freshwater section was 90% fines less than 1/4 inch in diameter and 10% gravels between 1/4 and 2 inches diameter. Run substrate in the tree-lined section was 40% fines less than 1/4 inch in diameter, 55% gravel up to 2 inches in diameter and 5% cobbles between 4 and 12 inches in diameter. Riffle substrate was 40% fines, 40% small gravel between 1/4 and 2 inches in diameter, 15% large gravel 2-4 inches in diameter and 5% cobble 4-7 inches in diameter. Embeddedness in riffles averaged 30%. The tidally influenced section was pool habitat with mud bottom.

TABLE 1. Calabazas Creek Water Quality Sampling in Reach 11, Between Old Mountain View Alviso Road and Tasman Drive. September 2-3, 1988

Weather: Clear, warm afternoon of 9/2. Overcast morning of 9/3, clearing at 10:00 a.m.

Site: 0.2 miles upstream of Old Mountain View Alviso Road with a high tide of 6.7 feet at about 18:30.

9/2: 16:00 incoming tide

Depth	Temp.	Salin.	$DisO_2$
surf	23.5 C	3.7ppt	7.8ppm
0.25m	23.5	3.7	7.4
0.5	23.5	3.7	7.3
0.75	23.5	3.7	7.2
1.0	23.5	3.7	7.2
1.25	23.2	3.7	7.2

16:56 incoming tide

Depth	Temp.	Salin.	$DisO_2$
surf	22.8 C	4.7ppt	4.3ppm
0.25m	22.8	4.8	4.3
0.5	22.8	4.8	4.3
0.75	22.9	4.8	4.2
1.0	22.9	5.0	4.2
1.25	22.9	5.0	4.1
1.45	22.9	5.1	4.0

17:53 flood tide

Depth	Temp.	Salin.	$DisO_2$
surf	22.5 C	4.9ppt	5.6ppm
0.25m	23.0	5.7	3.8
0.5	23.0	6.8	3.6
0.75	23.0	7.3	3.2
1.0	23.0	7.5	3.2
1.25	23.0	7.6	3.1
1.5	23.0	7.6	2.9

19:15 tide turned

Depth	Temp.	Salin.	$DisO_2$
surf	23.5 C	4.3ppt	5.8ppm
0.25m	23.5	4.5	5.4
0.5	23.5	4.8	5.4
0.75	23.5	6.1	3.9
1.0	23.5	7.1	3.7
1.25	23.5	7.1	3.2
1.5	23.5	7.1	2.4

9/3 08:27 ebb tide

Depth	Temp.	Salin.	$DisO_2$
surf	19.2 C	3.4ppt	5.2ppm
0.25m	19.2	3.4	4.7
0.5	19.2	3.4	4.6
0.75	18.9	3.4	4.4
1.0	19.0	3.4	4.2
1.1	19.0	3.4	3.7

09:49 ebb tide

Depth	Temp.	Salin.	$DisO_2$
surf	18.8 C	1.5ppt	6.8ppm
0.25m	18.9	1.5	6.8
0.5	18.9	1.5	6.8
0.75	18.9	1.5	6.5
0.85	18.9	1.5	6.4

12:05 ebb tide

Depth	Temp.	Salin.	$DisO_2$
surf	23.2 C	1.0ppt	9.9ppm
0.2m	23.2	1.0	9.8

TABLE 2. Calabazas Creek Water Quality Sampling in Reaches 9 and 10 Between Guadalupe Slough and Old Mountain View Alviso Road September 3-4, 1988

Weather: Clear, warm and breezy on afternoon of 9/3. Clear, calm and warm on morning of 9/4.

Site: Between Pump Station and Highway 237

9/3 15:08 incoming tide

Depth	Temp.	Salin.	$DisO_2$
surf	24.8 C	2.5ppt	15.4ppm
0.25m	24.8	2.5	15.7
0.5	24.1	2.5	16.2
0.75	23.0	2.5	17.4
1.0	23.0	2.8	16.6
1.1	22.5	2.8	11.0

17:16 incoming tide

Depth	Temp.	Salin.	$DisO_2$
surf	23.2 C	5.1ppt	4.6ppm
0.25m	23.2	5.1	4.6
0.5	22.2	5.1	4.4
0.75	22.2	5.2	4.4
1.0	22.2	5.2	4.3
1.25	22.2	5.2	4.3
1.5	22.2	5.2	4.2
1.75	22.2	5.3	4.2
2.0	22.2	5.3	4.2

Site: Between Guadalupe Slough and Pump Station

15:40 ebb tide

*(meter not registering correctly, no temp. data)

Depth	Temp.	Salin.	$DisO_2$
surf	*	3.5ppt	10.8ppm
0.25m	*	3.5	10.6
0.5	*	3.5	10.4
0.75	*	3.5	10.2
1.0	*	3.5	10.2
1.25	*		10.2

17:05 incoming tide

Depth	Temp.	Salin.	$DisO_2$
surf	23.0 C	5.9ppt	4.5ppm
0.25m	22.8	5.9	4.4
0.5	22.8	5.9	4.4
0.75	22.8	5.9	4.3
1.0	22.8	5.9	4.3
1.25	22.8	6.0	4.3
1.5	22.8	6.2	4.3
1.75	22.8	6.2	4.2
2.0	22.8	6.2	4.1

TABLE 2. (continued)

Between Guadalupe Slough and Pump Station

18:04 flood tide

Depth	Temp.	Salin.	DisO$_2$
surf	22.7 C	9.2ppt	4.5ppm
0.25m	22.9	9.2	4.5
0.5	22.9	9..2	4.4
0.75	22.9	9.2	4.4
1.0	22.9	9.2	4.3
1.25	22.9	9.2	4.3
1.5	22.8	9.3	4.3
1.75	22.8	9.4	4.3
2.0	22.8	9.4	4.3
2.25	22.8	9.4	4.1

18:51 tide turned

Depth	Temp.	Salin.	DisO$_2$
surf	22.8 C	9.8ppt	5.1ppm
0.25m	22.8	9.8	4.9
0.5	22.8	9.9	4.7
0.75	22.8	9.9	4.7
1.0	22.5	9.9	4.7
1.25	22.5	9.9	4.7
1.5	22.5	9.9	4.7
1.75	22.5	9.9	4.4
2.0	22.5	9.9	4.7
2.25	22.5	9.9	4.4

9/4 09:26 flood tide

Depth	Temp.	Salin.	DisO$_2$
surf	21.0	4.7	3.7
0.25	21.0	4.7	3.6
0.5	21.0	4.7	3.4
0.75	21.0	4.7	3.4
1.0	21.0	4.7	3.2
1.25	21.0	4.7	3.5
1.5	21.0	4.7	3.1
1.6	21.0	4.7	2.7

11:45 ebb tide

Depth	Temp.	Salin.	DisO$_2$
surf	22.0	3.5	5.8
0.25	21.4	3.5	5.7
0.5	21.4	3.6	5.7
0.75	21.5	3.6	5.5
1.0	21.5	3.7	5.5
1.25	21.5	3.7	5.5
1.5	21.9	3.6	5.1

Existing Aquatic Resources and Fishery Potential in the Freshwater Section Upstream of Tasman Avenue in Reach 12

Sampling occurred on August 30, 1988. No fish were collected in the freshwater section except for mosquitofish (Gambusia affinis). One site was located in the well shaded riparian corridor and the other site was upstream in an open area where the stream was lined only with cat-tails and tules. Sampling occurred on August 30, 1988. One fish that was electroshocked at the shaded station looked like a threespined stickleback (Gasterosteus aculeatus) but failed to be netted due to restricted visibility and net mobility in heavy overhanging vegetation and could not be positively identified. The absence of native fishes in this section may reflect habitat destruction and elimination of them prior to recharge operations by the water district or by the irregular schedule of recharge operations upstream, combined with flood flows that washed fish out of this section. Their absence may reflect their elimination as a result of previous stream relocation in the 1950's, channelization and maintenance which may have created water quality problems and habitat destruction. One would expect that fishes would return to the project area from populations upstream after stream relocation unless subsequent maintenance practices had prevented it.

Other aquatic vertebrates that use Calabazas Creek include tree frogs (Hyla regilla), western toad (Bufo boreas) and garter snakes (Thamnophis spp) (Smith, 1987). Swamp crayfish (Procambarus clarki) were abundant.

Little is known of the historical diversity of fish species in Calabazas Creek. No previous records of fish sampling have been found (Leidy, 1984). California roach (Lavinia symmetricus), Sacramento suckers (Catostomus occidentalis), hitch (Lavinia exilicauda) and threespined stickleback were probably native to the stream prior to reduction in flows from groundwater pumping and urbanization with its associated need for flood control channelization, concreting of streambeds and streambanks and elimination of cover with the clearing of streamside vegetation that have all contributed to the loss of these fish populations.

Even though streamflow in the section below Highway 101 appears to be perennial even during severe drought, the shortness of this stream reach apparently has been insufficient to provide a satisfactory refuge for these species in the past. Upstream of Highway 101 for about a mile to Kifer Road there was sufficient flow even this year to have supported California roach if there had been adequate streamside vegetation and a low flow channel. If these native species were reintroduced in Reach 1 after the riparian vegetation was allowed to return under the proposed project, they would probably maintain themselves until a major flood flow washed them out of the reach. Their repopulating after the flood flow would probably occur only if they had also been reintroduced in the impoundment downstream of Comer Drive, which would act as a refuge (Smith, 1987). However, the fishery potential in the freshwater portion of Calabazas Creek is small and precarious; drought might eliminate all fish upstream of Arques Avenue if perennial flows were not assured, and high flood flows would probably wash all fish out of the perennial freshwater section downstream of Arques Avenue. If freshwater fishes could survive in the tidally influenced section until high flows subsided, then they could continue to inhabit the creek after large flood flows. This appears to be the case for Sacramento blackfish in Coyote Creek and lower reaches of other South Bay creeks.

Even in wet years, the stream would be insufficient to maintain steelhead downstream of Arques Avenue because of the shortage of pools and good escape cover , and high summer temperatures caused by the lack of stream shading upstream of Highway 101 in the channelized and cleared reach. On August 30 during sampling, in the shaded area of Reach 12 the water temperature was 76 F at 1400 hr and in the unshaded area upstream in Reach 12 the water temperature was 81 F at 1530 hr. No steelhead habitat is accessible upstream (Smith, 1987). Spawning habitat was present for chinook salmon (Oncorhynchus tshawytscha) in Reach 1, but rearing habitat was in too short supply to maintain a population.

Existing Aquatic Resources and Fishery Potential in the Tidally Influenced Section (Reaches 9, 10, 11 and Part of 12)

This section represents an environmental transition zone from the mouth of Calabazas Creek at Guadalupe Slough, which is normally at least slightly saline in summer, up to a point upstream of Tasman Drive where salinity patterns fluctuate between moderate salinity and nearly freshwater with each tidal cycle.

Between Old Mountain View-Alviso Road and Tasman Drive, 500 feet of stream was sampled by gill netting, with net ranging from mesh size 1/2 inch to 4 inches, through one complete tidal cycle on September 2 and 3, 1988. Three euryhaline species were caught. Of 42 fish captured, 50% were staghorn sculpins (Leptocottus armatus), 40.5% were yellowfin gobies (Acanthogobius flavimanus) and 9.5% were northern anchovies (Engraulis mordax) (Table 3). If threespined stickleback had been present, they would not likely have been captured because the mesh size was too large. It is of interest that no goldfish (Carassius auratus) or carp (Cyprinus carpio) were captured. It could be that the recent dredging downstream combined with the lack of storms during the drought had eliminated most of the predominantly freshwater fishes without a chance of recolonization that may occur during freshwater influxes from storms.

Between Guadalupe Slough and Highway 237, the same 500 feet of gill netting were used as upstream through a tidal cycle on September 3 and 4, 1988. Five euryhaline species were caught (Table 3). Of 63 fishes captured, 54% were staghorn sculpins, 31.7% were northern anchovies, 11.1% were yellowfin gobies, 1.6% were starry flounders (Platichthys stellatus) and 1.6% were Sacramento blackfish (Orthodon microlepidotus). Sacramento blackfish may have been more numerous before the most recent dredging. Hitch (Lavinia exilicauda) may also have inhabited the lower reaches of the creek at an earlier time.

Stevenson et al. (1987) had an otter trawling station (SJ6), 1981-1986, approximately 1.5 miles downstream of Calabazas Creek in Guadalupe Slough. The following 5 species of 25 species collected were usually most abundant, based on our examination of their data; staghorn sculpin (year round with a low midsummer), northern anchovy (summer and fall), starry flounder (year round), shiner perch (Cymatogaster aggregata) (fall and winter), and yellowfin goby (summer and fall). Other species that were sometimes significant included threadfin shad (Dorosoma petenense), striped bass (Morone saxatilis) (December - May) longfin smelt (Spirinchus thaleichthys), threespined stickleback and Pacific herring (Clupea harengus pallasi). We would expect that Calabazas Creek could be inhabited by any of these species at times. Because of our limited sampling, some euryhaline species that inhabit Calabazas Creek may have been missed. Stevenson et al. (1987) also occasionally collected such predominantly freshwater species at station SJ6 as Sacramento suckers, Sacramento blackfish, hitch, and prickly sculpins (Cottus asper), all of which may have inhabited Calabazas Creek in the past.

TABLE 3. Calabazas Creek Gill Net Sampling
September 2-4, 1988

Gill Nets Used:
Two 125' long monofilament nets
25' each of mesh sizes: 1/2", 3/4", 1", 1 1/2", 2"

Two 50' long monofilament nets tied together
25' each of mesh sizes: 2 1/2", 3", 3 1/2", 4"

One 150' multifilament net
50' each of mesh sizes: 1", 1 1/2", 2"

Location: Reach 11. 0.2 miles upstream of Old Mountain View-Alviso Rd.

Set: 9/2 15:30-16:00
Checked Twice: 9/3 08:40-09:40, upon removal 9/3 12:10-12:40

Catch Results:

Staghorn Sculpin (21): 120mm Standard length 103, 98, 97, 97, 97, 96, 96, 96, 94, 93, 92, 92, 91, 91, 88, 88, 88, 86, 83, 80

Yellowfin Goby (17): 147, 146, 143, 142, 142, 138, 134, 130, 118, 107, 103, 103, 102, 102, 101, 100, 98

Northern Anchovy (4): 112, 111, 110, 105

Location: Reaches 9 and 10. Between Guadalupe Slough and Highway 237.

Set: 9/3 15:15-15:40
Checked Twice: 9/4 09:20-10:30, upon removal 9/4 11:00-11:30

Catch Results:

Staghorn Sculpin (34): 118, 110, 108, 105, 104, 102, 101, 100, 100, 100, 98, 97, 97, 97, 96, 96, 96, 96, 95, 94, 94, 93, 92, 90, 89, 89, 89, 89, 87, 87, 87, 87, 85, 85

Northern Anchovy (20): 120, 118, 116, 112, 111, 111, 110, 110, 109, 108, 106, 106, 106, 105, 104, 103, 99, 98, 94, 86

Yellowfin Goby (7): 146, 138, 108, 104, 101, 98, 95

Sacramento Blackfish (1): 89

Starry Flounder (1): 108

RARE, THREATENED, ENDANGERED AND LOCALLY UNIQUE FISH

No rare, threatened or endangered fish species are present in Calabazas Creek. Steelhead have been eliminated from most streams in the South Bay. Chinook salmon, which are not native to the South Bay area, now are apparently established in Coyote Creek, Guadalupe River and several other streams (Smith et al., 1988). Although no salmon were collected in our sampling, occasional adult strays may attempt to use Calabazas Creek for spawning, presumably with very limited, if any, success.

IMPACTS ON FISHERY RESOURCES BY THE PROPOSED PROJECT

From Guadalupe Slough to Tasman Drive (Reaches 9, 10 and 11), all riparian trees would be removed routinely, according to the maintenance guidelines of the proposed project. However, clearing would occur more frequently under the no project alternative. From Tasman Drive to Highway 101 (Reach 12), a permanent green belt on the west bank would be provided by the proposed project. This green belt would not be permitted under the no project alternative. The greater presence of stream shading under the proposed project would be a beneficial impact.

In Reach 12, the no project maintenance program would no longer allow the significant riparian corridor to develop on the east bank of the low flow channel. The channel banks would be cleared with greater frequency than historically. When trees become established on the west levee bank and overhang the stream, they will shade a portion of the low flow channel and provide cover. Provision of shade and cover would be a beneficial impact to the aquatic habitat.

The sediments and emergent vegetation (which provides habitat for fishes' food items and escape cover) in the low flow channel, will be excavated and removed less frequently in all reaches under the proposed project. This would be a significant beneficial impact over the no project alternative. However, in Reach 11 under the proposed project, excavation that forms a secondary channel would be less frequent than under the no project alternative. This would provide a secondary channel for a shorter duration and reduce fish habitat in the tidally influenced region compared to the no project alternative, which features a secondary channel. The loss of fish habitat in the secondary channel would be an adverse impact.

Construction Impacts

Construction of depressed maintenance roads between the levees would be done above the inundation zone. Therefore, only small amounts of muds may be disturbed during removal of vegetation. This would temporarily reduce water quality. Coffer dams would be constructed up and downstream of the construction areas. This may reduce feeding efficiency and oxygen absorption by fishes, temporarily, after the sections receive water again. There would be two summer periods of dewatering, probably in successive years. No dewatering is anticipated upstream of Tasman Drive. The blocking of the channel and reduction in water quality after opening of the coffer dams would reduce fish habitat area and may cause fishes to avoid the area until turbidity becomes reduced. These construction activities would be temporary and not result in significant adverse impacts.

MITIGATION OF FISHERY IMPACTS

Mitigation for Potential Adverse Impacts in Reaches 9 and 10.

No mitigation appears warranted for the long term effects of the proposed project in Reaches 9 and 10, because under the no-project flood control maintenance program, the District would routinely remove streamside vegetation and dredge the channel more frequently than is anticipated under the proposed project. The proposed project would require less frequent clearing of vegetation and perhaps no more dredging of the channel downstream of Old Mountain View-Alviso Road if an equilibrium is reached between degradation and aggradation near or slightly below the mean higher high water elevation , which seems likely. This would be a positive impact of the new project.

Mitigation for Potential Adverse Impacts in Reach 11.

To mitigate for the less frequent excavation of the sediment bench, when excavation becomes necessary according to the channel design criteria, an island would be left in the center of the channel in Reach 11 for 1300 feet of channel downstream of Tasman Drive. This would create a double channel as under no-project conditions. This would be accomplished by excavating a 35-foot-wide second channel to the elevation of the low flow channel. At the downstream end of the island, a connection of the second channel to the main low flow channel would be made. This would maximize the edge effect between the tules and the channel. It would also provide more substrate for aquatic invertebrates (fish food) to inhabit and more habitat for fish and shorebirds to feed within the tidally influenced channel.

Mitigation for Potential Adverse Impacts in Reach 12.

The proposed permanent green belt upstream of Tasman Drive would be permanent and not subject to periodic clearing. This would be an improvement to long-term fish habitat compared to no-project practices, once trees grow tall enough to provide shade and overhead fish cover. Therefore, mitigation will be unnecessary in Reach 12.

Mitigation for Construction and Short-Term Maintenance Impacts

Mitigation for water quality problems created by disturbances created by construction of depressed roads and future channel maintenance in the tidally influenced muds should include the scheduling of maintenance activities so as not to coincide with spawning and nursery times of fishes, February through July 1. Dredging or vegetation removal within the tidally influenced low flow channel should be done at low tide to minimize suspension of silt and mud in the water column.

LITERATURE CITED

Leidy, R.A. 1984. Distribution and Ecology of Stream Fishes in the San Francisco Bay Drainage. Hilgardia, 52 (8): 1-177.

Moyle, P.B. 1976. Inland Fishes of California. Univ. Calif. Press, Berkeley.

Smith, J.J. 1987. Fisheries Values of Calabazas Creek. To: Santa Clara Valley Water District. Harvey and Stanley Associates, Inc. File no. 347-01. 6pp.

Smith, J.J., D.W. Alley and M.L. Stevenson. 1988. Lower Coyote Creek Fisheries Evaluation. To: Santa Clara Valley Water District. Harvey and Stanley Associates, Inc. and Kinnetic Laboratories, Inc. File No. 182-11. 19pp. + Appendices.

Stevenson, M.L., T.C. Goddard, L.M. Kiguchi, and P.J. Kinney. 1987. South Bay Dischargers Authority Water Quality Monitoring Program Final Monitoring Report. To: South Bay Dischargers Authority. Kinnetic Laboratories, Inc. 467pp. + Appendices.

APPENDIX P

FISHERIES VALUES OF CALABAZAS CREEK LAWRENCE EXPRESSWAY TO MILLER AVENUE

THE HABITAT RESTORATION GROUP

JOHN STANLEY & ASSOCIATES

6001 BUTLER LANE, SUITE #1
SCOTTS VALLEY, CA 95066
(408) 438-4102

FISHERIES VALUES
OF CALABAZAS CREEK
LAWRENCE EXPRESSWAY TO MILLER AVENUE

Prepared By

The Habitat Restoration Group
Dr. Jerry J. Smith, Fisheries Ecologist

Prepared For

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, Ca 95118

Attn: Dr. Bernard Goldner

March 16, 1989

File No. 347-01

EXISTING CONDITIONS

Calabazas Creek was surveyed for aquatic habitat conditions and fisheries potential in May and August 1987. The entire accessible portion of the stream was surveyed to give a valid picture of the potential impacts of channel modifications in the Lawrence Expressway to Miller Avenue and the Miller Avenue to Comer Drive portions of the stream. The low flow conditions of the present drought year possibly failed to give a full picture of the stream's potential in wet years. They do indicate the conditions which would occasionally be expected to occur, and which would limit the long-term fisheries potential of the stream.

Natural streamflow was restricted to the channel upstream of Comer Drive in late May 1987. Flows ranged from 0.05 cfs above Comer Drive to 0.2 cfs at Via Regina; flow was 0.1 cfs at the uppermost measured site, at Mt Eden Road. In August only barely perceptible flow was present at the bridge at Mt. Eden Road; however, the streambed up and downstream from the bridge was dry. The remainder of the accessible stream had no natural streamflow. Although the watershed is quite small, it is possible that the extreme headwaters, above Mt. Eden Road, do maintain some perennial flow in drought years. Interviews with residents indicated that (low) streamflow persists in summer of many years downstream as far as Saratoga-Sunnyvale Road. In addition, the Santa Clara Valley Water District empties water from the Stevens Creek Pipeline into the streambed for groundwater percolation at the rail crossing upstream of Saratoga-Sunnyvale Road. In May and August 1987 these releases, of approximately 1 cfs, resulted in maintenance of streamflow downstream to near Bollinger Road (and occasionally as far as Highway 280). Releases from the pipeline are made independently of environmental considerations, and the affected streambed is occasionally allowed to dry.

Downstream to Saratoga-Sunnyvale Road the stream occupies a well-shaded and generally natural channel. The channel substrate is sand and gravel; almost no larger substrate materials are present except for some chunks of concrete. The channel above Saratoga-Sunnyvale Road has limited pool development, reflecting the absence of sustained high flows and also the absence of pool-developing structural features, such as boulders, logs, or sharp bends. Even if summer flows were present, most of the stream in that section would be shallow. Downstream of Saratoga-Sunnyvale Road shade diminishes and the streambed is wider and more channel-like. Downstream of Bollinger Road the stream is normally a wide, dry, unshaded urban canal, with flows normally present only after winter storms. Downstream of Lawrence Expressway the channel is concrete-lined.

Several important barriers are present on Calabazas Creek. Drop structures are present at Lawrence Expressway (3 1/2 foot high), Bollinger Road (6 foot high), Rainbow Drive (between Bollinger and Prospect Roads) (4 foot high), downstream of Prospect Road (3 foot high), and at Stevens Creek Blvd. (6 foot drop at 7 percent slope, within a box culvert). The drop structures at Bollinger Road and at Rainbow Drive are vertical drops and are absolute barriers to upstream fish movement. The drop structures at Lawrence Expressway, Steven's Creek Blvd. and below Prospect Road might be passable at high flows. A 400 foot long culvert passes under Saratoga-Sunnyvale and Prospect Roads, but does not appear to present passage problems. Downstream of Comer Drive a 12 foot high inclined (35 degrees) dam is an absolute barrier to upstream fish passage. The flood control and streambed stabilization structure impounds water to 6 feet deep during storm events, but has drains in its face so that depth is less than 2 feet between storms. Water remained in the impoundment throughout the summer of 1987.

FISHERIES POTENTIAL

No fish were collected or observed in Calabazas Creek in 1987, except for goldfish apparently released at Mt. Eden Road. Streamflows in the channel upstream of the pipeline inflow were almost gone by August, and the lack of fish in May sampling probably reflects the elimination of native fish by past stream dewatering due to headwater wells, groundwater pumping and periodic droughts. If fish were present in the headwaters, I would have expected them to also be present in the May sampling in the stretch from Mt. Eden Road to Comer Drive. The absence of fish in the areas receiving water district discharge may reflect elimination of native fish prior to discharge operations or the irregular schedule of discharge operations.

California roach (Lavinia symmetricus) and possibly threespine stickleback (Gasterosteus aculeatus) were probably native to the stream prior to the reduction in flows from groundwater pumping and suburbanization. The small size of the stream and its watershed, the periodic dewatering of most of it, and the absence of deep pool habitat preclude the maintenance of resident species other than those with small size, high reproductive rates, and broad tolerances, such as the threespine stickleback and California Roach. Even in wet years the stream would be unsuitable for steelhead, because of a lack of pools, good hiding cover, and suitable streamflows. In addition, 5 substantial barriers prevent steelhead access. At the present time any fisheries values for the stream would require a reintroduction, and then would be limited to the stream channel upstream of Miller Avenue. California roach and stickleback might possibly maintain themselves in the stream, if they were reintroduced to the impoundment downstream of Comer Drive. The impoundment would act as a refuge from which they could colonize upstream and downstream in wet years. The fish might also maintain themselves in the channel downstream of the water district discharge if the discharge was continuous. However, the fisheries potential is small and precarious; another drought might obliterate all fish if perennial flows were not assured.

Other aquatic vertebrates utilizing the stream include tree frog (Hyla regilla), western toad (Bufo boreas), and garter snakes (Thamnophis spp.). Toad larvae were common in the shallow, slow pools downstream of Rainbow Drive.

IMPACT OF CHANNEL MODIFICATION

As no fish are now present in the affected sections of stream, any impacts of the project are to potential fisheries only. There are presently no potential fisheries values downstream of Miller Avenue. Gabion-lining the banks for flood control in the Miller Avenue to Comer Drive portion of Calabazas Creek will have minimal effects on the limited potential fisheries values in the stream. Upstream of Saratoga-Sunnyvale Road there will be some loss of shade, and the channel modifications will result in some loss of potential hiding cover (overhanging vegetation, undercut banks). The species which could possibly maintain themselves in the stream are threespine stickleback and California roach, which would not be adversely affected by reduced stream shading. Reduced stream shading would probably increase algal growth in the channel. Threespine sticklebacks require algae for nest building, and omnivorous California roach often feed on algae. Both species are tolerant of the higher temperatures which might accompany reduced stream shading. Both species are able to utilize shallow pools, although deeper pools with hiding cover are preferred. Potential populations would be reduced by loss of overhanging vegetation and undercut banks where the channel sides are modified.

Potential fisheries habitat with or without channel modification is primarily dependent upon streamflow, which is determined by year-to-year variation in rainfall and upon artificial discharges from the water district pipeline.

MITIGATION OF POTENTIAL IMPACTS

To produce any fisheries values in Calabazas Creek would require reintroduction of threespine stickleback and California roach to the stream. Fish introduced at Mt. Eden Road, the impoundment near Comer Drive, and near Saratoga-Sunnyvale Road (downstream of the water district discharge to the stream) should reestablish the species. However, their continued existence would be dependent upon streamflows. Severe drought years and lack of continuous water district discharge into to the streambed would eliminate the fish. If perennial streamflows could be maintained by a combination of natural runoff and water district discharge, some fisheries values could be maintained in the stream.

APPENDIX Q

CULTURAL RESOURCE EVALUATION GUADALUPE SLOUGH TO LAWRENCE EXPRESSWAY

CULTURAL RESOURCE EVALUATION OF THE EXTENSION OF THE CALABAZAS CREEK FLOOD CONTROL PROJECT IN THE CITIES OF SANTA CLARA AND SUNNYVALE COUNTY OF SANTA CLARA

FOR
SANTA CLARA VALLEY WATER DISTRICT
#6080-89-190

BY
ARCHAEOLOGICAL RESOURCE MANAGEMENT
496 N. FIFTH STREET
SAN JOSE, CA 95112 (408)295-1373
ROBERT CARTIER, PRINCIPAL

MAY 1989

ADMONITION

Certain information contained in this report is not intended for general public distribution. Portions of this report locate significant archaeological sites in the region of the project area, and indiscriminant distribution of these data could result in the desecration and destruction of invaluable cultural resources. In order to insure the security of the critical data in this report, certain maps and passages may be deleted in copies not delivered directly into the hands of environmental personnel and qualified archaeologists.

THE PRINCIPAL INVESTIGATOR

ABSTRACT

Archaeological research was carried out for approximately 5.5 miles of Calabazas Creek in the Cities of Santa Clara and Sunnyvale in the County of Santa Clara. The study is an extension of a previous study of the upper Calabazas Creek conducted in July 1987. The research included an archival search in the State records and a surface survey of the creek alignment. The archival research revealed that there is a recorded archaeological site in the subject area. In addition, another area of prehistoric activity was noted during the surface reconnaissance. Both areas of prehistory activity are within the project alignment. Recommendations are included in the conclusion of this report.

REQUEST FOR ARCHAEOLOGICAL EVALUATION

The archaeological evaluation was carried out to determine the presence or absence of any significant cultural resources. Archaeological services were requested in May 1989 in order to provide a report that would: 1) undertake an archival study of the cultural resources in the vicinity of the property, 2) conduct a surface survey of the land, and 3) to provide a written report of the findings and any recommendations that would be appropriate.

LOCATION AND DESCRIPTION OF THE SUBJECT AREA

The subject area is a 5.5 mile segment of Calabazas Creek between Lawrence Expressway and Guadalupe Slough in the Cities of Santa Clara and Sunnyvale, County of Santa Clara. On the USGS 7.5 minute quadrangles of San Jose West and Milpitas, the Universal Transverse Mercator Grid (UTMG) end points of the project alignment are 589000/4133350 (San Jose West) and 589800/4141400 (Milpitas). The elevation ranges from approximately 0 to 120 feet MSL, and the nearest sources of fresh water is Calabazas Creek itself.

The proposed project consists of an extension to the Calabazas Creek flood control project with the addition to the original project alignment of the existing creek channel from Lawrence Expressway to Guadalupe Slough. Between Highway 101 and Tasman Blvd. work will include flood walls with trenches approximately four feet deep. Isolated flood walls will be constructed from Highway 101 upstream to Lawrence Expressway.

At the time of the surface reconnaissance, the majority of the project alignment was covered with concrete or levee construciton which greatly obscured the visibility of the native soils. Upstream reaches had less visibility due to concrete lining of the channel and intense development and landscaping of adjacent properties. Soil exposures were usually found at the upper edge of the concrete channel, and at the toes and sides of the levees. Also, some soil exposures directly adjacent to the SCVWD property were sometimes available in around of landscaping and gardens.

Two types of soils were noted in the study area: 1) dark brown loam with clay; and 2) light brown silt and loam. The darker soil was common downstream of Central Expressway, and the lighter soil was present upstream of Central Expressway. Midden soil was found in the two archaeologically sensitive areas. Rock in the project area consisted primarily of native gravels of sandstone and chert. Often on the levee surfaces and adjacent to streets, imported construction gravel was present.

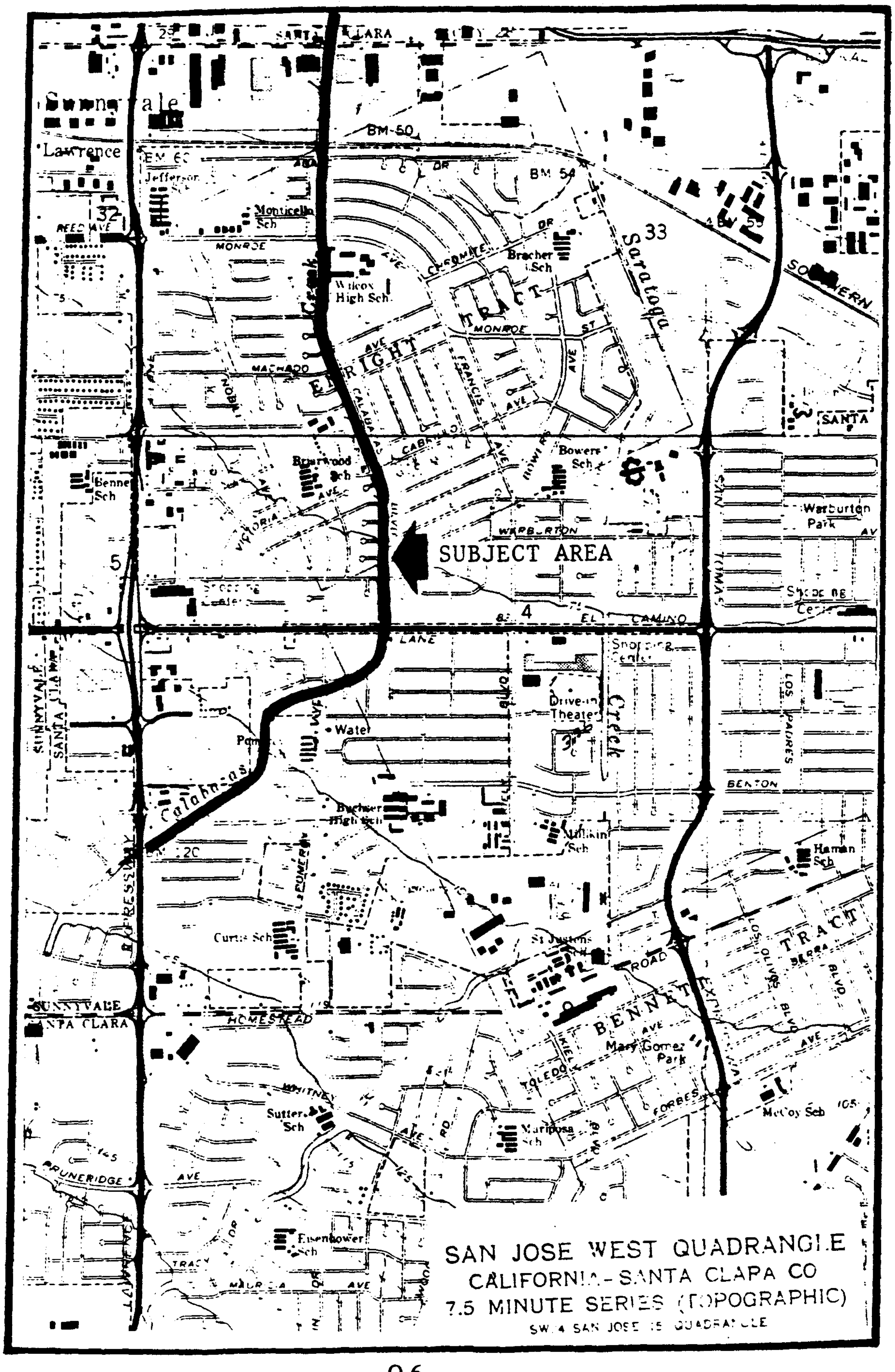
ARCHIVAL BACKGROUND AND SURFACE RECONNAISSANCE

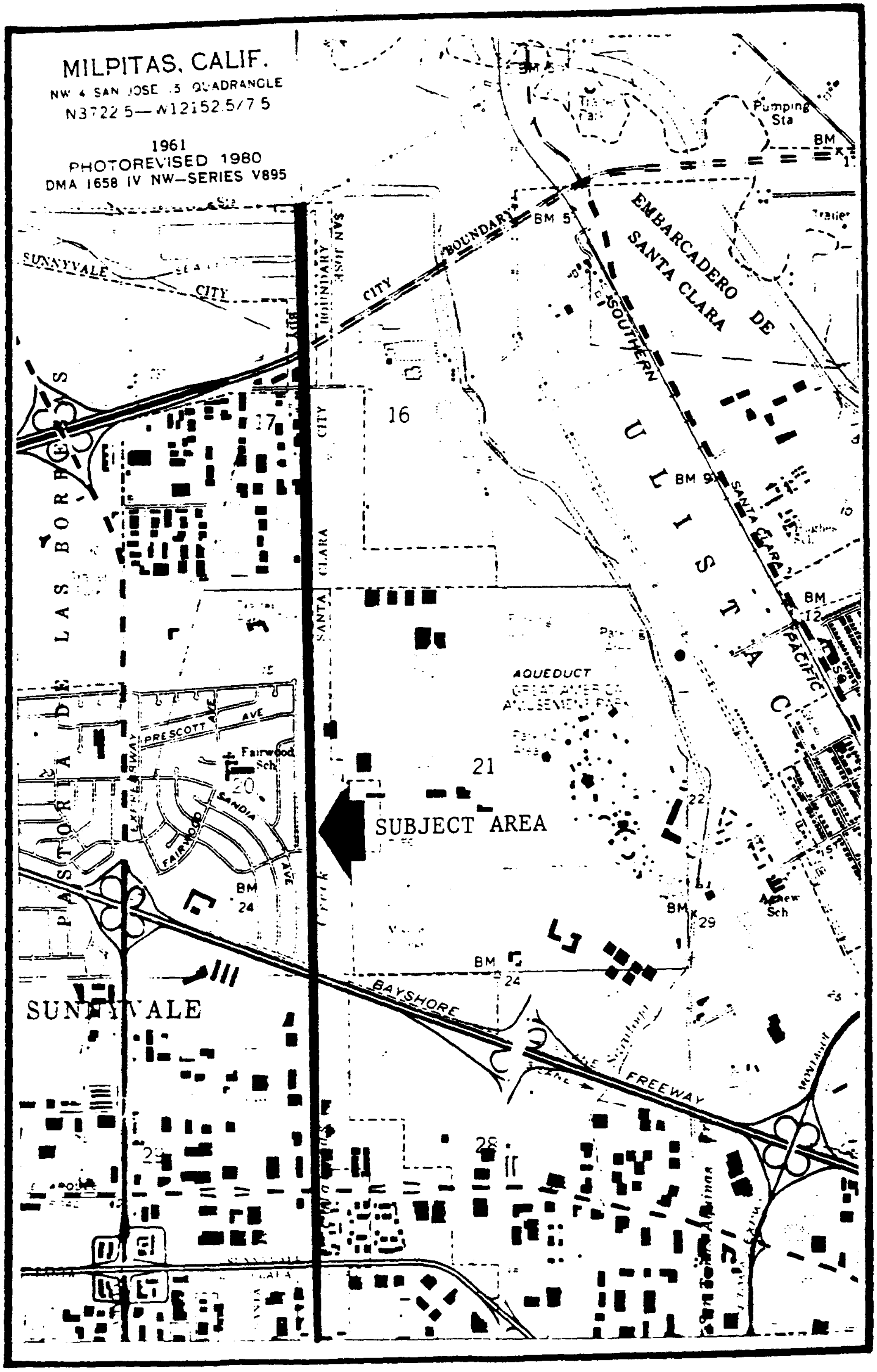
Archival: Prior to reconnoitering the subject area, a study of the maps and records at the Northwest Information Center of the California Archaeological Site Inventory was conducted and given the file number of 6080-89-190. This research into the records at the Information Center was done to determine if any known archaeological resources were reported in or around the subject area. One archaeological has been recorded within the project alignment. This site, CA-SCl-134, known as the Warburton Site, was recorded in 1974 by Robert Edwards and is located on the west bank of Calabazas Creek at Central Expressway. According to the archaeological site record, SCl-134 is a prehistoric habitation site containing a large number of chipped and ground stone tools. Two burials were recovered by Stanford University. The site has been greatly impacted by development in the area.

Surface Survey: A "general surface reconnaissance" was conducted by the Principal Investigator on all open land surfaces in the subject area. A "controlled intuitive reconnaissance" was performed in places where burrowing animals, exposed banks and inclines, and other activities had revealed subsurface stratigraphy and soil contents. This involved walking 100% of the alignment, on both the east and west sides. Historic glass, ceramics, and general trash were noted along the project alignment; however, no significant history resources were found. Two areas of prehistoric activities were noted within the project alignment. CA-SCl-134 was relocated in the field in landscaping of business developments adjacent to the creek. In addition, a new site was noted on the creek alignment near Mission College approximately 500 feet downstream (north) of Bayshore Freeway. This site has been named the "Mission College Site." Both sites are characterized by midden soil, fire-altered rock (cooking stones), and chipped lithics.

CONCLUSION AND RECOMMENDATIONS

Based upon the surface survey, it appears that significant cultural resources exist within the subject area. Two loci containing prehistoric materials were noted in the project alignment in the vicinity of Mission College and at Central Expressway. It is therefore recommended that earthmoving activities in these two areas by monitored by a qualified archaeologist. The recommended monitoring zone at CA-SCl-134 extends from the Southern Pacific railroad tracks north of Agate Drive to E. Arques Road. The recommended archaeological monitoring zone associated with the Mission College site extends from the Bayshore Freeway north to Prescott Avenue. In the event cultural remains are exposed during construction, the archaeologist should examine the findings and make appropriate recommendations.


SAN JOSE WEST QUADRANGLE
CALIFORNIA - SANTA CLARA CO
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 SAN JOSE 15' QUADRANGLE
SUBJECT AREA
Sunnyvale
Lawrence
SANTA CLARA
Jefferson Sch
Monticello Sch
Wilcox High Sch
Bracher Sch
Briarwood Sch
Bowers Sch
Bennett Sch
Warburton Park
Buchser High Sch
Milikin Sch
Curtis Sch
Haman Sch
St Justins
Mary Gomez Park
Sutter Sch
Mariposa Sch
McCoy Sch
Eisenhower Sch
Drive-in Theater
Shopping Center
Water
ELDRIGHT TRACT
BENNETT TRACT
Saratoga
Calabazas
Creek
EL CAMINO
MONROE
HOMESTEAD
PRUNERIDGE AVE
WARBURTON
SOUTHERN
SAN TOMAS
LOS PADRES
BENTON
EXPRESSWAY
BM 50
BM 54
32
33
5
4


MILPITAS, CALIF.
NW 4 SAN JOSE 15 QUADRANGLE
N3722.5—W12152.5/7.5
1961
PHOTOREVISED 1980
DMA 1658 IV NW—SERIES V895
Pumping Sta
BM 1
BM 5
CITY BOUNDARY
SAN JOSE
SUNNYVALE CITY
EMBARCADERO DE SANTA CLARA
SOUTHERN PACIFIC
ULISTAC
BM 9
BM 12
16
17
20
21
22
28
29
LAS BORREGAS
PASTORIA
PRESCOTT AVE
Fairwood Sch
SANDIA AVE
FAIRWOOD
LAWRENCE EXPWY
SANTA CLARA
AQUEDUCT
GREAT AMERICA AMUSEMENT PARK
SUBJECT AREA
BM 24
BAYSHORE FREEWAY
Agnew Sch
SUNNYVALE

APPENDIX R

CULTURAL RESOURCE EVALUATION LAWRENCE EXPRESSWAY TO MILLER AVENUE

CULTURAL RESOURCE EVALUATION OF THE CALABASAS CREEK FLOOD CONTROL PROJECT IN THE CITIES OF CUPERTINO AND SANTA CLARA, COUNTY OF SANTA CLARA

FOR
SANTA CLARA VALLEY WATER DISTRICT
#6080-87-274

Robert Cartier, Ph.D.

BY
ARCHEOLOGICAL RESOURCE MANAGEMENT
ROBERT CARTIER, PRINCIPAL
JULY 1987

ADMONITION

Certain information contained in this report is not intended for general public distribution. Portions of this report locate significant archeological sites in the region of the project area, and indiscriminant distribution of these data could result in the desecration and destruction of invaluable cultural resources. In order to insure the security of the critical data in this report, certain maps and passages may be deleted in copies not delivered directly into the hands of environmental personnel and qualified archeologists.

THE PRINCIPAL INVESTIGATOR

ABSTRACT

Archeological research was carried out for approximately two miles of Calabasas Creek in the Cities of Santa Clara and Cupertino, County of Santa Clara. The research included an archival search in the State records and a surface survey of the property. The archival research revealed that there were no recorded archeological sites within or adjacent to the subject area. No evidence of cultural resources were noted during the surface reconnaissance.

LOCATION AND DESCRIPTION OF THE SUBJECT AREA

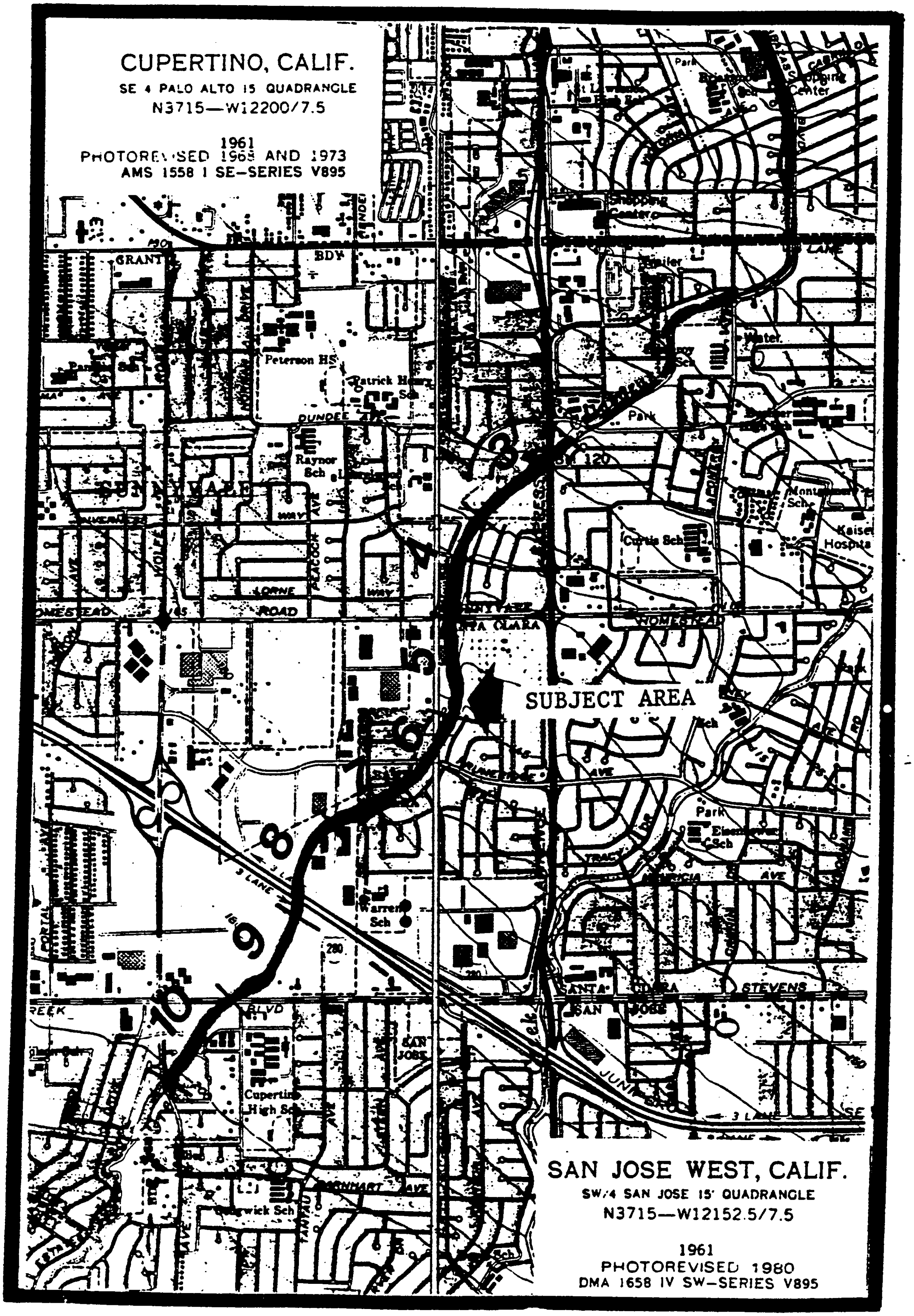
The subject area is a two mile segment of Calabasas Creek between Lawrence Expressway and Miller Avenue in the Cities of Santa Clara and Cupertino, County of Santa Clara. On the USGS 7.5 minute quadrangle of Cupertino and San Jose West, the Universal Transverse Mercator Grid (UTMG) endpoint locations of the study area are 589000/4133350 (San Jose West) and 587400/4130550 (Cupertino). The elevation is 120-200 feet MSL, and the nearest source of fresh water is Calabasas Creek within the study area.

At the time of the surface reconnaissance, only a small portion of the existing creek contained exposures of native soils. The majority of area was covered in vegetation, debris, recent flood soils deposition, or concrete. The vegetation included berry and poison oak. The native soils varied between light tan silty loam to dark brown clay-rich loam. Rock in the creek bed and banks included sandstone and chert gravels along with import construction gravels.

The proposed project consists of a flood control project along the existing creek channel from Lawrence Expressway to Miller Avenue. Work will include bridge replacements, gabion construction, ramps, a high-flow bypass channel, and some modifications to dimensions of creek bed and banks.

REQUEST FOR ARCHEOLOGICAL EVALUATION

The archeological evaluation was carried out to determine the presence or absence of any significant cultural resources. Arche-


CUPERTINO, CALIF.
SE 4 PALO ALTO 15 QUADRANGLE
N3715—W12200/7.5
1961
PHOTOREVISED 1968 AND 1973
AMS 1558 I SE–SERIES V895
SUBJECT AREA
SUNNYVALE
Peterson HS
Patrick Henry Sch
Raynor Sch
Curtis Sch
Kaiser Hospital
Warren Sch
Cupertino High Sch
Sedgwick Sch
Shopping Center
HOMESTEAD
ROAD
LORNE
STEVENS
SANTA CLARA
SAN JOSE
1
2
3
4
5
6
8
9
10
SAN JOSE WEST, CALIF.
SW/4 SAN JOSE 15' QUADRANGLE
N3715—W12152.5/7.5
1961
PHOTOREVISED 1980
DMA 1658 IV SW–SERIES V895

ological services were requested in July 1987 in order to provide a report that would: 1) undertake an archival study of the cultural resources in the vicinity of the property, 2) conduct a surface survey of the land, and 3) to provide a written report of the findings and any recommendations that would be appropriate.

ARCHIVAL BACKGROUND AND SURFACE RECONNAISSANCE

Archival: Prior to reconnoitering the subject area, a study of the maps and records at the Northwest Information Center of the California Archaeological Site Inventory was conducted and given the file number of 6080-87-274. This research into the records at the Regional Office was done to determine if any known archeological resources were reported in or around the subject area. There were no recorded archeological sites reported in or adjacent to the subject area. Previous archeological surveys of the subject area have been negative.

Surface Survey: A "general surface reconnaissance" was conducted by the Principal Investigator on all open land surfaces of the subject parcel where vegetation and open space allowed for surface inspection. A "controlled intuitive reconnaissance" was also performed in places where burrowing animals, exposed banks and inclines, and other activities had revealed subsurface stratigraphy and soil contents. Soil visibility was available along the orchards in Reaches 1B and 3A, and along the bank erosion in Reach 5. Reach 7 was not surveyed as it is an existing buried culvert with no work proposed. Several of the creek bank exposures contained sorted gravels indicating flood deposition. Some of these banks also contained historic debris from disposal into the creek bank. Broken concrete walls and slabs were common throughout the study area, particularly abundant in Reach 8. Turn-of-the-century ceramic and bottle fragments were found in Reach 3B in a very disturbed condition and in recent flood soil matrix. This reconnaissance also included a cursory survey of the residential and industrial neighborhoods adjacent to the creek alignment. Exposed soils in the neighborhoods were not frequently available. Where soil was exposed, it lacked traces of cultural resources. No indications of prehistoric resources were noted anywhere in the survey area.

CONCLUSION AND RECOMMENDATIONS

Based upon the archival records and the surface survey, it does not appear that any significant cultural resources exist within the subject area. It is therefore concluded that the proposed project would have no direct or indirect impact upon cultural resources. In the event, however, that archeological traces (human remains, artifacts, concentrations of shell/bone/rock/ash) are encountered, all construction within a fifty meter radius of the find should be stopped, the Planning Department notified, and an archeologist retained to examine the find and recommend mitigations as necessary.

APPENDIX S

MITIGATION AND MONITORING PLANS FOR BIOLOGICAL IMPACTS

I. BRACKISH MARSH MITIGATION AND MONITORING PLAN
(Report prepared by H.T. Harvey & Associates, dated October 6, 1993)

II. RIPARIAN HABITAT MITIGATION AND MONITORING PLANS
- For impacts within Corps jurisdiction
(Report prepared by H.T. Harvey & Associates, dated October 1992)
- For impacts outside Corps jurisdiction

III. BIOLOGICAL BASELINE REPORTS
- Wetlands Determination (Reaches 9-12)
- HEP Analysis (Reaches 1-8)

IV. ARMY CORPS OF ENGINEERS PUBLIC NOTICE AND SECTION 404 PERMIT

V. MEMORANDUM OF UNDERSTANDING WITH CALIFORNIA DEPARTMENT OF FISH AND GAME AND SECTION 1601 AGREEMENTS

VI. PLATES SHOWING TYPICAL PLANTING ARRANGEMENTS
(Riparian Habitat, Reaches 1-8)

VII. MONITORING CHECKLIST
(Includes mitigation for impacts other than biological.)

APPENDIX S-I

BRACKISH MARSH HABITAT MITIGATION AND MONITORING PLAN

SANTA CLARA VALLEY WATER DISTRICT

CALABAZAS CREEK BRACKISH MARSH HABITAT MITIGATION AND MONITORING PLAN

Project No. 2010

Public Notice No. 16833S92

Prepared by:

H. T. Harvey and Associates
Ronald R. Duke M.A., Principal
Dan Stephens, Project Manager

Prepared under the Direction of:

Dr. Bernard H. Goldner
Environmental Specialist

Cynthia A. Roessler
Assistant Environmental Specialist

Randall R. Talley
Flood Control Planning
Division Engineer

P. Kay Whitlock
Flood Control Manager

Ronald R. Esau
General Manager

Date of Preparation: October 6, 1993

Date of Submittal to Corps of Engineers: March, 1994

DISTRICT BOARD OF DIRECTORS

Rosemary C. Kamei	District 1	James J. Lenihan, Vice Chairman	District 5
Patrick T. Ferraro	District 2	Sig Sanchez	At Large
Robert W. Gross	District 3	Joe Judge	At Large
Joe Donohue, Chairman	District 4		

R9519tp

This document will be distributed to the following contact persons:

Calvin Fong
Chief, Regulatory Branch
San Francisco District
U. S. Army Corps of Engineers
211 Main Street
San Francisco, CA 94105

Dr. Bernard Goldner
Environmental Section, Project Development Branch
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

James Browning
U. S. Fish and Wildlife Service
2800 Cottage Way, Room E - 1803
Sacramento, CA 95825-1846

Michael Thabault
National Marine Fisheries
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404

Mike Monroe
U. S. Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Carl Wilcox
California Department of Fish and Game
P.O. Box 47
Yountville, CA 94599

TABLE OF CONTENTS

PROJECT SUMMARY S-13

PROJECT DESCRIPTION S-14

GOAL OF THE MITIGATION S-21

FINAL SUCCESS CRITERIA S-26

PROPOSED MITIGATION SITE S-29

IMPLEMENTATION PLAN S-31

MAINTENANCE DURING MONITORING PERIOD S-36

MONITORING PLAN S-37

COMPLETION OF MITIGATION S-42

CONTINGENCY MEASURES S-43

REFERENCES CITED S-45

TABLES

1 Special Status Animal Species S-20

2 Monitoring Schedule S-39

FIGURES
(Located in Appendix 1)

1 Project Area Road Map
2a-b Jurisdictional Impact Areas
3 USGS Quad Map - Project Area
4 Reference and Mitigation Site Location Map
5a-e Mitigation Site Preparation
6 Typical Planting Configuration

APPENDICES

(Following page S-47)

1 Figures
2 Plant Species List
3 Vertebrate Wildlife Species List
4 Invertebrate Species List
5 Project Schedule
6 Sample Data Collection Sheet

PROJECT SUMMARY

This mitigation and monitoring plan has been prepared to address impacts and mitigation related to the construction of flood control measures along approximately one mile in Reaches 9-11 of Calabazas Creek. Appendix 1 contains figures showing the project location and the proposed mitigation. The flood control project will permanently remove 1.7 acres of brackish marsh within the jurisdiction of the Corps of Engineers during the construction of maintenance roads and access ramps. This mitigation plan proposes to compensate for that 1.7 acre impact by creating 1.7 acres of new brackish marsh in Reach 9. The mitigation area will be created by relocating a levee to expand an existing marsh plain bench 12-20 feet in width. This new marsh plain area will extend along Reach 9 of Calabazas Creek and will continue up San Tomas Aquino Creek to Highway 237. The new marsh plain will be graded to accommodate natural recruitment, and planted with native marsh species. The progress of the revegetation will then be monitored for a period of five years. Specific success criteria, as described in this plan, must be met for the mitigation effort to be considered to have adequately compensated for the 1.7 acres of impact.

I. PROJECT DESCRIPTION

A. PROJECT LOCATION

The Santa Clara Valley Water District (SCVWD) proposes to construct flood control measures along approximately seven miles of Calabazas Creek between Guadalupe Slough and Miller Avenue in the cities of Santa Clara, Sunnyvale and Cupertino in Santa Clara County. This plan is specific with respect to those impacts and mitigation that will occur in the approximately 1 mile long portion of the project which is tidal (Reaches 9-11 of Calabazas Creek from Guadalupe Slough to Tasman Drive). All figures are contained in Appendix 1. Figure 1 is a road map to the Reach 9-11 project area, Figures 2a-b show the extent and location of impacts to jurisdictional wetlands, and Figure 3 is a USGS quad map of the project area. Mitigation for impacts to wetlands in Reaches 9-11 shall be installed in Reach 9 of Calabazas Creek and in San Tomas Aquino Creek from the confluence of the two creeks upstream to the Highway 237 bridge.

B. OVERALL PROJECT SUMMARY

Project Goal

The goal of the Calabazas Creek Flood Control Project is to provide 100 year flood protection and control sedimentation and erosion. The entire project will cover approximately seven miles of Calabazas Creek, from Miller Avenue downstream to the Guadalupe Slough.

Proposed Construction

The proposed flood control project will: 1) modify 15,000 feet of existing levees; 2) construct 11,000 feet of floodwall and 9,000 feet of gabion-lined channel; 3) modify or replace 13 bridges and culverts; 4) build five thousand feet of depressed maintenance roads and 25 channel access ramps. In Reach 9, the eastern levee will be relocated, the western levee will be raised, Moffet Park Drive bridge will be floodproofed, and the Highway 237 bridges will be raised (by Caltrans). In Reach 10, levees will be raised, depressed maintenance roads will be constructed, and the bridge at Old Mountain View Alviso Road will be floodproofed. In Reach 11, levees will be raised, depressed maintenance roads will be constructed and the Tasman Drive bridge will be floodproofed. The estimated total cost of the entire project is $ 16.5 million (SCVWD 1992).

Overall Project Impacts

The flood control project will impact riparian habitats at various locations along the riparian corridor. Impacts to riparian habitat in Reaches 1-8 were examined by the project Habitat Evaluation Procedure (HEP) which compared pre- and post- project conditions. The HEP analysis found that these impacts will be more than adequately mitigated by the installation of approximately 4,500 riparian plants in gabions and at the top of bank, a reduced and refined schedule for maintenance of vegetation in the flood control channel, the inclusion of a bypass channel in Reach 1B to minimize impact to a natural section of the creek, and the planting of streambed vegetation in Reach 3A.

Only a portion of these riparian impacts are within the jurisdiction of the Corps of Engineers. In Reaches 3A and 11, 0.09 acres of instream hydrophytic vegetation and 0.06 acres of willow riparian habitat will be removed within Corps jurisdiction. These impacts will be mitigated by direct planting of streambed vegetation in Reach 3A and are addressed in a mitigation plan separately submitted to the Corps.

The project will also result in the loss of 1.7 acres of coastal brackish marsh along Reaches 9-11 (SCVWD 1992). This plan specifically addresses those jurisdictional impacts which will occur in Reaches 9-11. Those impacts to coastal brackish marsh shall be mitigated by the restoration and creation of a similar habitat in Reach 9 and along San Tomas Aquino Creek.

C. RESPONSIBLE PARTIES

The responsible party for this project is the Santa Clara Valley Water District (District). The principal contact person at the District is:

Mr. Randall Talley, Supervising Engineer
Flood Control Planning Division
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

telephone (408) 265-2600

This mitigation and monitoring plan was prepared by H. T. Harvey and Associates. Ronald Duke was the project principal and Dan Stephens the project manager.

D. JURISDICTIONAL AREAS TO BE FILLED

A total of 1.7 acres of coastal brackish marsh below the high-tide line will be impacted by the project. The impacts will be caused by the construction of maintenance roads and access ramps. Figures 2a-b provide the position and acreage for these impacts. Figure 2 also shows the position of the high-tide line, which represents the limit of Corps' jurisdictional waters. The high-tide line is based on a standard high tide 7.2 feet above mean lower low water, which is 2.86 feet below NGVD (National Geodetic Vertical Datum) at the Golden Gate Bridge, adjusted to the project area elevation NGVD.

The high tide line was calculated using a regression equation developed by the District for the South Bay:

Tide near Alviso = 1.42 + 1.05 (tide at Golden Gate above NGVD)

Thus, for the Calabazas high-tide line:

$$1.42 + 1.05\ (7.20 - 2.86) = 5.97\ \text{NGVD}$$

Adjacent wetlands were identified by the Habitat Restoration Group in 1991 using the Federal Manual for Identifying and Delineating Wetlands which was active at that time (Habitat Restoration Group, 1991).

E. TYPES, FUNCTIONS AND VALUES OF THE JURISDICTIONAL AREAS

1. Jurisdictional Area Habitat Type

The jurisdictional areas to be removed during project construction comprise coastal brackish marsh bordering the channel of the creek. The marsh grows in continuous bands (20-30 feet wide) on both sides of the channel. The channel is 20-60 feet wide and has a low flow channel invert approximately 6-10 feet below the marsh plain. The District dredges the channel periodically to maintain flood capacity, thus channel and marsh habitats are subjected to regular disturbance.

2. Jurisdictional Area Functions And Values

Water Quality. The hydrology of Calabazas Creek in Reaches 9-11 is influenced by the interface of saltwater from the San Francisco Bay with freshwater from the Calabazas Creek watershed. The upper limit of the saltwater/freshwater interface in most cases does not exceed Tasman Drive. The lower limit, during extremely low tides, is the confluence of San Tomas Aquino Creek, Calabazas Creek, and Guadalupe Slough (SCVWD 1992). Thus, the area is usually subjected to brackish water, with an occasional influx of fresh water at extreme low tide. Water salinities in the project area range from 2.6 to 10.0 parts per thousand (ppt) during the summer months (Phil Williams Associates 1989). In the winter and early spring the salinities would be expected to remain in the lower levels of that salinity range.

The tidal elevations (in feet NGVD) in the project area are as follows :

Mean higher high water	5.16
Mean high water	4.42
Mean tide level	0.82
Mean low water	-2.77
Mean lower low water	-3.91

(source: Phil Williams and Assoc. 1989)

The aggradation rate in Reaches 9-11 is approximately 0.7 feet per year, with a climax sediment elevation of approximately 5 feet NGVD (SCVWD 1992). This climax sediment level correlates with the elevation of the existing brackish marsh vegetation (4.12 to 5.12 feet NGVD). Elevations below approximately 3.0 feet NGVD are open water habitat.

Vegetation. The existing coastal brackish marsh in the impact areas is dominated by alkali bulrush (*Scirpus robustus*), California bulrush (*Scirpus californicus*), and broad leaf peppergrass (*Lepidium latifolium*), intermixed with a variety of brackish marsh species. Appendix 2 contains a listing of the plant species of the impact areas. As one moves upstream through Reaches 9-11 the water becomes increasingly fresh and the vegetation changes accordingly. The eastern side of Reach 11 has been recently dredged and currently supports little marsh vegetation, primarily sparse *Scirpus californicus*. In Reach 9 there is a marsh transition zone in which more salt-tolerant plant species occur. This transition zone is dominated by broad leaf peppergrass and alkali bulrush in the overstory and fleshy jaumea (*Jaumea carnosa*) and common pickleweed (*Salicornia virginica*) in the understory. There are no special status plants species in the impact areas.

Vertebrate Wildlife. The habitat within the impact areas comprises channel, brackish marsh and marsh transition zone. Examples of resident avian species associated with these habitats include: Pied-billed Grebe, Double-crested Cormorant, Mallard, Cinnamon Teal, Gadwall, and American Coot in the channel; Great Blue Heron, Great Egret, Snowy Egret, Black-crowned Night Heron, Common Moorhen, Marsh Wren, Song Sparrow, and Red-winged Blackbird in the marsh; and Killdeer, Black Phoebe, Loggerhead Shrike, Brewer's Blackbird, and House Finch along the toe of the levee and in the transition zone. Typical migrant and wintering species that occur in the impact area include Virginia and Sora Rails in the marsh; Ruby-crowned Kinglet, Yellow-rumped Warbler (insectivores that forage in the marsh), and Lincoln's White-crowned and Golden-crowned Sparrows (which roost in the marsh vegetation and forage in weedy patches along the toe of the levee and in the transition area). Several species of raptors have been observed foraging over the impact areas. These species include Peregrine Falcon, Merlin, Black-shouldered Kite, Northern Harrier, Sharp-shinned Hawk, Red-tailed Hawk, and Barn Owl. Aerial insectivores that occur over the reach include five species of swallows and Vaux's Swift (during migration). A complete wildlife species list, including scientific names of species, is presented in Appendix 3.

Generally, these brackish marsh habitats support relatively few amphibian or reptile species. Pacific treefrogs, bullfrogs, western fence lizards, and alligator lizards are the most likely occurring herpetiles. Adult California red-legged frogs (proposed for listing as a federal endangered species, and a California "species of special concern") and southwestern pond turtles (a federal candidate species 2 and a California species of special concern) inhabit brackish marsh habitats with soil salinity below 8 ppt (M. Jennings pers. comm.). However, these species would not be expected to breed in such habitats and would only occur in the impact areas if they were washed downstream from the upper reaches of Calabazas. The potential presence of mosquito fish and bullfrogs represent additional stress factors that minimize the possibility of California red-legged frogs persisting in the impact areas. Therefore, it is highly unlikely that either of these special status species occurs in Reaches 9-11. Table 1 contains a listing of special status species and describes the potential for them to occur on the site.

The salt marsh harvest mouse (state and federally endangered) and the salt marsh wandering shrew (federal candidate 1 species) are generally found in salt marshes dominated by pickleweed. The brackish marsh of Reaches 9-11 does not present suitable habitat for either one of these mammals and hence, neither species would be expected in these marshes. Small mammal trapping was conducted in 1988 and no salt marsh harvest mice or salt marsh wandering shrews were found (H. T. Harvey and Associates 1988). The trapping did confirm the presence of common western harvest mouse (*Reithrodontomys megalotis*), house mouse (*Mus musculus*), and California ground squirrel (*Spermophilis beecheyi*). Additional probable resident mammals include the California vole, deer mouse, and Norway rat. Mammalian carnivores, such as the long-tailed weasel and raccoon are expected to hunt or forage in the marsh. The Yuma myotis and little brown myotis may forage for insects over the impact areas.

Fishery resources were sampled by gill netting in 1988 in Reaches 9-11. Among the species caught were staghorn sculpin (*Leptocottus armatus*), yellowfin goby (*Acanthogobius flavimanus*), northern anchovy (*Engraulis mordax*), starry flounder (*Platichthys stellatus*), and Sacramento blackfish (*Orthodon microlepidotus*). Other species which would typically inhabit these reaches include hitch (*Lavinia exilicauda*), shiner perch (*Cymatogaster aggregata*), threadfin shad (*Dorosoma petenense*), striped bass (*Morone saxatilis*), longfin smelt (*Spirinchus thaleichthys*), threespined stickleback (*Gasterosteus aculeatus*), Pacific herring (*Clupea harengus pallasi*), Sacramento sucker (*Catostomus occidentalis*), prickly sculpin (*Cottus asper*), goldfish (*Carassius auratus*), and carp (*Cyprinus carpio*).

Invertebrates. The impact area was surveyed at a reconnaissance level for invertebrates and a literature search was conducted. One species of crayfish, *Procabarus clarki*, was found during seine net surveys of the channel (SCVWD 1992). No endangered invertebrate species are expected to occur in the impact area (Appendix 3; California Department of Fish and Game 1990; SCVWD 1992). Based on invertebrate surveys in similar brackish marshes along Suisun Bay (H.T. Harvey and Associates unpublished data) and the reference area of Reach 9 (Appendix 4), the vegetation would be expected to provide habitat for numerous insects and arachnids. Benthic invertebrates should include nematodes, foraminiferans, oligochaetes, colembolans, larval dipterans, amphipods of the family Talitridae, larval coleopterans and numerous mites. Appendix 4 contains a listing of the invertebrate families of the reference area.

Recreational Use. The service roads on the levee tops receive moderate recreational use on weekdays by mid-day joggers and walkers. Bird watchers also use the area occasionally. It should be noted, however, that these service roads are not open to the public.

TABLE 1.
State or federal special status animal species; their status, and potential occurrence at Calabazas Creek, Reaches 9 - 11. Santa Clara County, California

SPECIES		STATUS	POTENTIAL FOR OCCURRENCE ON SITE
Common Name	Scientific Name		
State or Federally Endangered or Threatened			
American Peregrine Falcon	*Falco peregrinus anatum*	FE, CE	Observed foraging on site.
California Clapper Rail	*Rallus longirostris obsoletus*	FE, CE	Not observed during surveys, presumed absent.
Salt Marsh Harvest Mouse	*Reithrodontomys raviventris raviventris*	FE, SE	Surveys conducted, none found; presumed absent.
California Species of Special Concern, State Protected, or Federal Candidate or Proposed Species			
California Tiger Salamander	*Ambystoma tigrinum californiense*	FC2, S	Unlikely; no breeding habitat.
California Red-legged Frog	*Rana aurora draytoni*	FP, S	Unlikely; no breeding habitat.
Double-crested Cormorant	*Phalacrocorax auritus*	S	Observed foraging on site; no breeding habitat.
White-faced Ibis	*Eudocimus albus*	S	May occur, observed locally; no breeding habitat.
Black-shouldered Kite	*Elanus caeruleus*	CP	Observed foraging on site.
Northern Harrier	*Circus cyaneus*	S	Observed foraging on site.
Sharp-shinned Hawk	*Accipiter striatus*	S	Observed foraging on site.
Cooper's Hawk	*Accipiter coorperii*	S	Likely transient
Merlin	*Falco columbarius*	S	Observed foraging on site.
California Gull	*Larus californicus*	S	Common forager; no breeding habitat.
Burrowing Owl	*Athene cunicularia*	S	Observed foraging along levee.
Short-eared Owl	*Asio flammeus*	S	Possible forager.
Loggerhead Shrike	*Lanius ludovicianus*	FC2	Observed resident.
Salt Marsh Yellowthroat	*Geothlypis trichas sinuosa*	FC2	Observed breeder.
Tricolored Blackbird	*Agelaius tricolor*	FC2, S	Unlikely, but possible transient.
Salt Marsh Wandering Shrew	*Sorex vagrans halicoetes*	FC1, S	No suitable habitat; presumed absent.

FE = Designated as an endangered species by the federal government.
FP = Proposed for listing as endangered or threatened species by the federal government.
FT = Designated as a threatened species by the federal government.
CE = Designated as an endangered species by the California Fish and Game Commission.
FC1 = Designated as a candidate species by the federal government. Occurrence on list 1 indicates that U. S. Fish and Wildlife Service has sufficient biological information to support a proposal to list the species as Endangered or Threatened.
FC2 = Designated as a candidate species by the federal government. Occurrence on list 2 indicates that U. S. Fish and Wildlife Service has potential information for upgrading listing to endangered or threatened, but conculsive data on the biological vulnerability and threat are not currently available to support proposed listing.
S = Species of special concern, including species whose breeding populations in the state have declined severely or are otherwise so low that extirpation is a real possibility. There are no special legal statutes governing the protection of this group.
CP = Fully protected species in the state of California.

II. GOAL OF THE MITIGATION

A. TYPE OF HABITAT TO BE CREATED

The Santa Clara Valley Water District (District) proposes to provide in-kind mitigation for impacts to areas within Corps jurisdiction. The mitigation area will be created as a landward extension of the existing marsh by excavating the existing levee to provide a new marsh plain area. A coastal brackish marsh will be created by planting and natural recruitment of bulrush resulting in a revegetation area with plant species similar, but not identical, to the species in the impact areas. The variability between the plant species in the impact areas and the species selected for the mitigation area reflects the slightly higher salinity of the water in the mitigation area compared to the impact areas of Reaches 10-11. The restored marsh will be dominated by dense stands of bulrush (*Scirpus robustus* and *Scirpus californicus*) in its lower to mid-elevations. A mixture of transition zone marsh species will be established in the upper elevations of the mitigation area along Calabazas Creek. A transition zone is not proposed for the mitigation area along San Tomas Aquino Creek since the existing marsh in that area supports very few transition zone plants. The lack of a transition zone along San Tomas Aquino Creek may be related to a greater influx of fresh water in that channel. The mature mitigation marsh plain (4.0-4.2 feet NGVD) will be an direct extension of the existing marsh and will be inundated by tides with approximately the same regularity as the existing marsh in the mitigation area. Figure 4 shows the position of the mitigation area.

B. FUNCTIONS AND VALUES OF HABITAT TO BE CREATED

Introduction

Two marsh areas that support the plant species proposed for the mitigation site were selected as reference sites. These marshes will serve as models of the mitigation site's ultimate habitat functions and values. The reference areas were selected because of their ecological similarity to both the impact areas and the proposed mitigation areas, their proximity to the mitigation areas, and the fact that they will not be disturbed by future District maintenance activities. One reference site is a prime example of a bulrush marsh and the other site has a well-established transition zone. The bulrush marsh reference site is located immediately downstream of the confluence of Calabazas Creek and San Tomas Creek on the northern side of the channel. The transition zone reference site is located at the toe of the levee bordering the existing marsh in Reach 9 of Calabazas Creek. Data collected at the two reference sites were used to develop success criteria for the mitigation site. Figure 4 shows the location of the reference sites.

Water Quality

The information on water quality of the impact areas (section I.E.2) is roughly applicable to the mitigation and reference areas, given the proximity of all the locations. The water salinity along the Calabazas Creek mitigation area is expected to range seasonally from 2.6 to 10.0 parts per thousand (ppt). Water salinity along the San Tomas Aquino Creek mitigation area is comparable to the lower salinities (2.6-4.0 ppt) found along Calabazas Creek. This lower salinity is indicated by increasing occurrence of cattails, a lack of transition zone plant association, and by lower soil salinities. The water remains brackish, however, as bulrushes are still a dominant species in the San Tomas Aquino marsh. The water in Guadalupe Slough adjacent to the reference area is also slightly fresher than the water adjacent to the Calabazas Creek mitigation area due to the influx of more fresh water from San Tomas Aquino Creek. Given the proximity of the three areas, however, significant differences in vegetation or wildlife as a result of different salinities are not anticipated.

Vegetation

Alkali Bulrush Reference Site. The alkali bulrush reference site is a coastal brackish marsh plain averaging 175-200 feet in width and is 2,200 feet long. Percent cover of alkali bulrush was measured along 20 pairs of transects laid out every 106 feet along the entire length of the reference site (Figure 4). A single 25 foot transect was placed perpendicular to the channel at each transect and a second 25 foot transect bisected the first transect at a right angle.

The overall cover of the alkali bulrush association reference site was 100%. The cover of the individual marsh species were as follows:

alkali bulrush	76%
narrow-leaved cattail	17%
California bulrush	6%
broad leaf peppergrass	1%

Appendix 2 lists all plant species encountered at the alkali bulrush reference site.

Transition Zone Reference Site. The marsh transition zone reference site is located in Reach 9 of Calabazas Creek. It extends for 1,300 feet along the eastern side of the creek and is bordered on one side by the edge of the existing alkali bulrush marsh and on the other side by the toe of the levee. The mitigation area will be constructed immediately adjacent to this transition zone. The success criteria which have been derived from the site will serve as benchmarks against which mitigation site progress can be gauged over time. Percent cover in the transition zone was measured along 20 pairs of transects placed at 66 foot intervals along the entire length of the reference site. The first transect was placed 175 feet north of Moffet Park Drive bridge (Figure 4). A 6 foot transect was placed at each transect interval perpendicular to the channel and each transect was bisected by a second 6 foot transect at a right angle.

The vegetation in the transition zone reference area forms two distinct canopy layers. The upper canopy is waist high and lower canopy is generally less than one foot. Data were therefore separated into overstory and understory percent cover. The only non-native plant species commonly observed in this area was broad leaf peppergrass.

The percent cover by overstory vegetation totaled 80%, with the individual species breakdown as follows:

broad leaf peppergrass	55%
alkali bulrush	21%
marsh grindelia	4%
Oregon golden aster	0.4%
narrow-leaved cattail	0.2%

The percent cover by understory vegetation was 52% with the individual species breakdown as follows:

fleshy jaumea	26%
common pickleweed	25%
water parsley	0.4%
saltgrass	0.3%
brass buttons	0.3%
medicago sp.	0.2%

The data collected on the understory vegetation were used to develop the success criteria for the mitigation area's transition zone.

Vertebrate Wildlife

The reference area is similar to the impact area in wildlife species composition. However, the reference area probably supports a slightly higher avian species diversity due to more extensive marsh habitat, closer proximity to the Bay, and a more extensive channel relative to the impact area. All species listed under the impact area would also occur in the reference area (see Appendix 3). Deer mice may be less likely to occur in the reference area due to the lack of upland vegetation. The reference area is also unsuitable for both the salt marsh harvest mouse and the salt marsh wandering shrew because it is predominantly brackish marsh, not salt marsh as is preferred by those two species.

An extensive analysis of winter avian occurrence in the general region of the project sites found that the site supported a variety of wintering water and land birds and that winter avian occurrence peaked from January through March (H.T. Harvey and Associates 1989b). In addition, a baseline Habitat Evaluation Procedure (HEP) was developed for the adjacent Sammis site (H.T. Harvey and Associates 1985). The Sammis site is located in the area bounded by the mitigation area and State Route 237. The HEP analysis predicted 68 vertebrate species on the site. Most of these species would occur in the project areas as well.

A species of concern that occurs in the region, but is not known from the site or the immediate vicinity of the site, is the California Clapper Rail (SCVWD, 1992). Clapper Rails occur during the breeding season in brackish marshes along Guadalupe Slough downstream from the reference site (H.T. Harvey and Associates 1991). In addition, California Clapper Rails have been found, throughout the year, in other South Bay brackish marshes (H.T. Harvey and Associates 1989). However, based on survey data, the project area is too far upstream and the habitat too limited to support this species. Thus, the California Clapper Rail is presumed absent from the reference and the mitigation areas.

A subspecies of increasing local concern is the Salt Marsh Yellowthroat (*G.t. sinuosa*), a candidate for designation as a threatened or endangered subspecies by the federal government. This species has been observed in the brackish marshes of Reach 9. Because other subspecies of the Common Yellowthroat occur in the area during migration and winter, and because the subspecies is apparently unidentifiable in the field, only summer records of Common Yellowthroat should be considered Salt Marsh Yellowthroats. Two pairs of Salt Marsh Yellowthroats have been observed in brackish marsh habitat near the confluence of Calabazas Creek and Guadalupe Slough and several more pairs have been observed farther downstream along the slough (Hobson et al. 1986).

Among the species of fish that typically inhabit Guadalupe Slough adjacent to the reference site are the following: starry flounder, Sacramento blackfish, hitch, shiner perch, threadfin shad, striped bass, longfin smelt, three-spined stickleback, Pacific herring, Sacramento sucker, goldfish, carp, and prickly sculpin.

Invertebrates

Reconnaissance level invertebrate surveys were conducted at the reference site on 10 April 1992. Two sample points were randomly chosen, one further out in the marsh and one closer to the levee. An insect net was swept through the vegetation five times in each area. A total of 20 minutes was spent conducting the sweep surveys in each of the two areas. The contents of each sweep were placed in a sample jar and later transferred to 70 percent alcohol upon return to the laboratory.

One soil-core sample was taken in each area in the following manner: A 10 cm diameter core sampler was pressed into the soil to a depth of 10 cm. The sampler was removed carefully using a shovel and the core sample was removed from the sampler using a plunger. The soil-core samples were transferred in plastic bags to the laboratory for testing. Soil core samples were placed intact into Berlese funnels (Cameron, 1972) for seven days to allow invertebrates to migrate out of the soil and into a jar of 70 percent alcohol. The invertebrate survey did not include oligochaetes, foraminiferans or nematodes which, although undoubtedly present in the soil, cannot be extracted using the Berlese funnel technique.

Invertebrates were examined under a binocular microscope and identified to the lowest possible taxonomic group. The results of the invertebrate survey are presented in Appendix 4. A total of 18 families representing ten orders of invertebrates were found in the reference area. No special status species were identified as occurring in the area.

Recreational Use

Recreational use in the vicinity of the mitigation site is limited to moderate use of the service road on the levee top by joggers, walkers and birdwatchers.

C. TIME LAPSE

It is estimated that a healthy brackish marsh ecosystem will be fully established at the mitigation site 5 years after plant installation. The marsh should exhibit plant cover and wildlife use of the mitigation site comparable to that seen at the reference site.

III. FINAL SUCCESS CRITERIA

A. TARGET FUNCTIONS AND VALUES

Vegetation

The ultimate goal for vegetation in the mitigation area is a habitat of equal or greater value than the impact area's habitat. The final success criteria cited below were derived from the reference sites, which comprise high-value marsh vegetation. It is anticipated that the mitigation area will achieve the final success criteria approximately 5 years after installation. No maintenance activities will be undertaken in the mitigation area in the two years prior to the attainment of final success criteria.

Alkali Bulrush Association. Percent cover by native marsh species at the reference area was 99%. The water salinity at the reference site, although comparable to San Tomas Aquino Creek, varies slightly from that in Calabazas Creek and the species composition in the different marsh areas varies accordingly. Therefore, it is not proposed that the percent cover for individual species observed at the reference area be used to set success criteria for individual species in the mitigation area. It is proposed that success criterion for the mitigation site's alkali bulrush association be establishment of 80% cover by *Scirpus* and *Typha* species. This dual species success criterion will allow for a varying mosaic of these native species to develop in the mitigation area.

Marsh Transition Zone Association. Percent cover by native marsh species at the reference site was approximately 26% for the overstory and 50% for the understory. Percent cover success criteria for each individual species is not proposed, as the plant association that ultimately develops will be an unpredictable mosaic influenced by microhabitat conditions. The success criteria are set at 25% native marsh species for the overstory and 50% native marsh species for the understory. The overstory native marsh species will contain primarily alkali bulrush and the understory will comprise primarily pickleweed and fleshy jaumea. Based on observation in the existing marshes, it is anticipated that broad leaf peppergrass could invade up to 55% of the overstory. Maintenance measures to minimize the establishment of this noxious species on the site are discussed in Section V.C.

Vertebrate Wildlife

The ultimate success of the restoration will be judged by re-establishment of breeding territories for marsh birds. Specific indicator species will be the Salt Marsh Yellowthroat and the Marsh Wren. Breeding surveys will be conducted to compare the reference and restoration sites over time. Successful re-establishment of breeding territories comparable to the reference site will indicate success of restoration. This should be attained by Year 5 following mitigation installation.

The Salt Marsh Yellowthroat is a federal candidate for listing as under the Endangered Species Act. The current status of this species in the reference area is unknown, however, the existing strip of vegetation along Calabazas Creek and Guadalupe Slough near the confluence has supported at least two pairs in the past (Hobson et al. 1986). The extension of the brackish marsh vegetation via realization of the mitigation plan will add approximately 1.7 acres of brackish marsh to the existing marsh. This increase will enhance the area's habitat value for Salt Marsh Yellowthroats; however, precise quantification of this increase is difficult. First, Salt Marsh Yellowthroat distribution is patchy, with some areas supporting relatively high densities and other areas of seemingly appropriate habitat supporting no pairs. Second, some areas are occupied in particular years but not others with no apparent change in habitat between years. Third, the absolute number of breeding pairs appears to fluctuate substantially. This fluctuation may be correlated with variation in annual precipitation (Foster 1977, Hobson et al. 1986). Finally, Common Yellowthroat territories are generally situated in such a way that they occupy a section of open channel and adjacent marsh rather than being arranged linearly within a marsh (Foster 1977). Adding a linear strip of habitat to an existing marsh does not translate into additional yellowthroat habitat in a direct manner. Therefore, the most appropriate monitoring approach is to conduct comparative studies of the mitigation and reference areas over time. No monitoring of fisheries is proposed since the project will have a negligible effect on that resource.

Invertebrates

The mitigation area is expected to establish numbers of invertebrate species comparable to that of the reference area. Appendix 4 contains a list of the invertebrate species found at the reference area. The development of invertebrate populations will affect the food chain of the mitigation site. For example, the Salt Marsh Yellowthroat is generally insectivorous and has been observed to feed on at least six of the ten invertebrate orders collected in the reference area (Foster, 1977; Appendix 3). The success of the Salt Marsh Yellowthroat in the mitigation area may partially depend on the success with which the invertebrate community becomes established. No monitoring of invertebrate species is proposed.

B. TARGET HYDROLOGY REGIME

The mitigation marsh plain will be constructed as an extension of the existing marsh and will thus be inundated with approximately the same frequency. The mitigation area will be partially inundated during mean high tides (4.42 feet NGVD) and fully inundated by mean higher high water (5.16 feet NGVD). Two and ten year flood events will inundate the mitigation area to depths of 2 and 5 feet, respectively.

C. TARGET JURISDICTIONAL ACREAGE TO BE CREATED

The mitigation site will increase the acreage of jurisdictional wetlands by 1.7 acres. Figures 5a-5e show the layout of the mitigation site. Following site grading, the high-tide line will be extended landward by approximately 12-20 feet to the toe of the new levee. Following site construction, a survey shall be conducted to confirm the elevations of the mitigation marsh plain and the exact position of the high tide line.

IV. PROPOSED MITIGATION SITE

A. LOCATION AND SIZE OF THE MITIGATION AREA

The mitigation site is located in Reach 9 of Calabazas Creek and part of adjacent San Tomas Aquino Creek (Figure 4). The mitigation area is 12-22 feet wide, 3700 feet long, and covers 1.7 acres (Figures 5a-5e). It stretches 1430 feet along the east bank of Calabazas Creek, from the north side of Moffet Park Drive to the confluence with San Tomas Aquino Creek, and along the southern bank of San Tomas Aquino Creek upstream to within 120 feet of Highway 237. This site overlaps the most downstream reach in which impacts will occur. The mitigation site was chosen because of its proximity to the impact locations, because it is compatible with the proposed flood control measures, and because the site will be a no-maintenance area which will be untouched by future channel clearing. The Calabazas Creek flood control project will decrease the flood capacity of Reach 9 by lowering the levee, but it will also widen the marsh plain, thus creating an ideal location for wetland mitigation.

B. OWNERSHIP STATUS

The Santa Clara Valley Water District (District) has an easement right of way at the mitigation site. Currently, the underlying fee title holder is Caltrans.

C. EXISTING FUNCTIONS AND VALUES OF MITIGATION AREA

The mitigation area is currently a flood control levee which is barren of vegetation except for occasional non-native, ruderal plants. The levee side slope is occasionally used by foraging raptors and could be a nesting site for Burrowing Owls. In general, the slope's value to wildlife is poor due to the compacted soil and sparse vegetation. The adjacent marsh is good quality wildlife habitat and probably supports breeding populations of some special status birds (see Table 1). However, project construction will occur starting in July (after the spring breeding season) thus nesting birds will not be disturbed.

D. PRESENT AND PROPOSED USES OF MITIGATION AREA

The levee is currently used as a maintenance road and flood control barrier by the District. It also receives some recreational use (see section I.E). A PG&E natural gas pipeline, oriented east-west, bisects the levee near its midpoint along the mitigation site on Calabazas Creek. The pipeline is buried sufficiently deep to avoid interference with mitigation site preparation.

Another mitigation project has been installed on the property bordered by Calabazas Creek, San Tomas Aquino Creek and State Route 237. This property is referred to as the Sammis mitigation site and will be developed to compensate for wetlands impacts from SR 237 construction. An outlet structure is situated at the confluence of Calabazas Creek and San Tomas Aquino Creek. This outlet pipe and catwalk structure traverse the mitigation area. An inlet structure for the Sammis site is located next to the Moffet Park Bridge, but will not be within the limits of the mitigation area. Figures 5c and 5e, respectively, show the positions of the outlet and inlet structures. The area of the outlet structure is included in the calculations of wetland acreage created.

E. JURISDICTIONAL DELINEATION

The only jurisdictional area which overlaps with the proposed mitigation area is the portion of the existing levee slope between the toe of the levee slope and elevation 5.97 feet NGVD (high tide line). This area varies from approximately 0.5 to 1.5 feet above the toe of the levee. The habitat values of this area, which is vegetated sparsely, are very low. The installation of the mitigation marsh plain will replace this low value jurisdictional area with high value marsh vegetation. The jurisdictional area along the toe of the relocated levee is not being counted as part of the mitigation acreage.

F. PRESENT AND PROPOSED USES OF ALL ADJACENT AREAS

The outboard side of the mitigation area will continue to be occupied by the existing marsh and creek channels. The reconstructed levee will serve as a flood control structure and service road on the levee side of the mitigation area. The levee encircles the Sammis property, which has been developed as a 60 acre wetland mitigation site by the Santa Clara County Traffic Authority and Caltrans. Construction of the Sammis mitigation site has been completed and the site ultimately will be owned and managed by the U. S. Fish and Wildlife Service as a part of the San Francisco Bay Wildlife Refuge. The presence of this mitigation site will enhance the habitat values of the mitigation area and surrounding marshes.

A closed landfill is located on the Lands of Hoxie to the north and east of the mitigation site across San Tomas Aquino Creek. The City of Sunnyvale proposes to install some habitat mitigation and also develop a city park to the northwest of the mitigation site.

G. ZONING

The mitigation site is zoned agricultural, as are the Sammis site, the landfill to the north and east, and the proposed city park area to the northwest.

V. IMPLEMENTATION PLAN

A. RATIONALE FOR EXPECTING MITIGATION SUCCESS

The hydrology and soils of the proposed mitigation site are discussed in sections III-B and V-C of this document. As described in those sections, both site hydrology and soils will be conducive to the establishment of brackish marsh vegetation.

The Santa Clara Valley Water District (District) has experience implementing several restoration projects in wetlands and riparian zones. H. T. Harvey and Associates has designed many habitat restoration projects during the past 15 years, including over 20 projects during the past three years. The combined experience of the District and Harvey and Associates is assurance that the project is designed by qualified professionals and will be implemented and maintained by an agency with restoration experience.

B. RESPONSIBLE PARTIES

The responsible party for ensuring proper implementation of the restoration plan is:

Dr. Bernard Goldner
Environmental Section, Project Development Branch
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

telephone (408) 927-0710

C. SITE PREPARATION

A variety of flood control modifications in Reach 9 of Calabazas Creek and adjacent San Tomas Aquino Creek will change the configuration of the channel and the levees. Coffer dams will be used during construction to protect active grading areas and minimize siltation of the creeks. The existing marsh, measuring 10-40 feet in width between the creek channels and the existing levees, will be preserved as a habitat area. The existing levee to the east of the Calabazas channel and the levee to the south and west of the San Tomas Aquino channel will be moved 20-30 feet back from the existing marshes to create a bench on which 1.7 acres of wetland mitigation will be installed (Figure 5 - Mitigation Site Preparation).

The mitigation area will be graded down to an elevation of approximately 3.0 feet NGVD (1.5 feet below the elevation of the existing marsh). A dozer tractor and hoe-type excavator will be used to grade and excavate the site. The exposed sub-soil, which is highly compacted, will then be ripped to a minimum depth of 12 inches to facilitate root penetration and the percolation of water. Final grading will include the placement of small drainage cuts through the existing marsh in order to facilitate drainage of ebb flows. Over time, natural sedimentation and tidal action will raise the elevations of the mitigation area towards the climax sediment elevation of approximately 5 feet NGVD.

Biological monitoring during grading will be provided by the District (contact person cited below) or by their designated consultant:

Dr. Bernard Goldner
Environmental Section, Project Development Branch
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

telephone (408) 927-0710

Due to the timing of the earth work (estimated completion October 1995), and the optimal plantings season (March), the mitigation area will not be planted until well after the earth work is completed. The site shall be monitored between the completion of the earth work and planting to determine the extent of any invasion of broad leaf peppergrass, a weedy non-native. Appropriate measures will be used to control all peppergrass. Control measures will also be enacted if the cover of other non-native species exceeds one percent. Contingency measures will be initiated if the cover of non-native species, including peppergrass, exceeds one percent.

D. PLANTING PLAN

Two plant associations are proposed for the mitigation site: an alkali bulrush association and a marsh transition zone association. The species which compose these plant associations predominate in the brackish marshes contiguous to the mitigation site and will be compatible with the post-construction site conditions. These species will also provide valuable wildlife habitat in the form of nesting materials/sites, food, and cover.

The alkali bulrush association will be the dominant plant association established on the site, and will cover approximately 1.3 acres. This association will be a natural extension of the alkali bulrush vegetation which currently occupies the middle elevations of the existing marsh (approximately 4.0 to 5.1 feet NGVD). Alkali bulrush will be seeded and plugs will be installed between the toe of the mitigation bench to within 3 linear feet from the toe of the levee along Calabazas Creek, and across the entire mitigation bench along San Tomas Aquino Creek.

California bulrush and cattails are expected to develop among the alkali bulrush on the marsh plain. These two species will recolonize the site via seeds and rhizomes transported by wind, water and animals.

The marsh transition zone association will cover approximately 0.1 acres of the mitigation area. This plant association will be installed from the edge of the alkali bulrush association to the toe of the levee in the upper 3 linear feet of the mitigation bench, at an approximate elevation of 4.2 feet. This plant association will be dominated by pickleweed. Other native plants may also colonize the transition zone, including marsh grindelia, Oregon golden aster, alkali heath, and fat hen.

The plant associations proposed in this mitigation plan will be planted and seeded to facilitate the rapid revegetation of the site. These revegetation efforts will also be aided by natural recruitment of brackish marsh species from adjacent brackish marsh vegetation. It is expected that the influence of daily tidal inundation will hasten natural recruitment.

All mitigation areas will be properly signed to ensure that flood control maintenance crews do not inadvertently clear vegetation from the mitigation areas. Permanent signs will be prominently placed at the beginning and end of all mitigation areas, and not less than one sign every 500 feet along its length.

Alkali Bulrush Plant Association

Alkali bulrush is the only species that will be actively planted on the marsh plain since it is the dominant species in the immediate area. California bulrush will not be planted since it is not abundant in the project area. Cattails are relatively abundant in the area but seeding of this species is not an established procedure and planting of cattail rhizomes would be a prohibitively expensive task.

The entire alkali bulrush planting area will be sown with alkali bulrush seed. The optimal water salinity at which alkali bulrush seed germinates is very low, with 0.0 parts per thousand (ppt) considered optimal and little germination occurring at levels of 10 ppt and above (Rollins 1981). Summertime measurements of water salinities at the mitigation site range from 2.6 to 10.0 ppt. Winter and early spring salinities would be lower due to greater freshwater inflow. Therefore, it is very probable that early spring will be a suitable time to seed the site. Winter seeding is not recommended due to the negative effect of low temperatures on seed germination.

The highest germination success rate for alkali bulrush in natural brackish marshes probably occurs when rains lower soil and water salinities towards 0-2 ppt. Therefore, it will be critical to monitor soil and water salinity at the mitigation site prior to seeding. Salinity measurements could be taken twice a week (starting in late February) to determine if salinity levels are appropriate for seeding. If the seed has not germinated during the three weeks following seeding, the site shall be reseeded.

The entire alkali bulrush planting area also will be planted with alkali bulrush plugs at a rate of 5 plugs at 25 feet on center for the entire length of the marsh (Figure 6).

Alkali bulrush seed and plugs shall be custom collected. The seeds can be harvested in early fall and stored in a cool dry place. Before sowing, seed should be soaked in a solution of four parts freshwater to one part household bleach for two-three days prior to sowing (George n.d., Rollins 1981). Seed should then be rinsed and allowed to soak in freshwater for an additional 24 hours. Seed should be hand sown at the rate of 45 lbs./acre and incorporated into the upper 1/4 inch of the soil surface with rakes or a similar method. The first seeding will be done in March, and, if necessary, a second seeding will be done in April. The plugs will be harvested in early fall and installed immediately.

Workers will place planks on the soil surface to access the planting zone without becoming mired in and disturbing the marsh soil. Care must be taken to avoid damaging naturally sprouting marsh vegetation in the planting area during all planting operations.

Transition Zone Plant Association

The transition zone plant association is expected to comprise a variety of native and non-native plant species. Pickleweed will be the dominant species in the understory. This zone will include some fleshy jaumea, alkali heath, salt grass, and marsh grindelia. The overstory will be composed primarily of alkali bulrush and broad leaf peppergrass. Pickleweed is the only species which will be actively planted since its propagation is a well-established procedure that has been implemented successfully on other sites in the South Bay.

Pickleweed will be planted as plugs. Plugs shall be harvested from plants in good health which are within 3 miles of the mitigation site from District lands. There are several nearby locations where pickleweed could be harvested. Only 500 plugs will be required thus it will be relatively easy to find sufficient quantities. The condition of the harvest locations will be evaluated 3 months prior to planting and the most healthy stands will be selected to harvesting by a qualified biologist. The optimal time for harvesting plugs is in February and March. Planting should be conducted within 3-6 hours of harvesting. Plugs should be 4-6 inches in diameter at the base and contain intact roots and above ground vegetative growth. Plugs should be harvested manually in 1 x 6 foot strips to avoid undue impact to the harvest site. Harvest sites should be a minimum of 10 feet apart. Given the small areas to be disturbed, there is minimal potential for harming any salt marsh harvest mice, nevertheless the U. S. Fish and Wildlife Service should be consulted with prior to harvesting to ensure that adequate protective measures are taken.

The pickleweed plugs will be spaced approximately two feet apart (Figure 6). Plugs will be installed in holes 4" deep with the roots fully buried and the shoots fully exposed. The soil around the plugs should be tamped firmly into place.

Levee Slopes

The reconstructed levee slope adjacent to the mitigation area will be composed of highly compacted soil that will have relatively minimal potential for erosion. Nevertheless, the levee slope will be hydroseeded with a native grass seed mix. The seed mix will be composed of 30 pounds per acre of meadow barley (*Hordeum brachyantherum*) and 30 pounds per acre of California brome (*Bromus carinatus*). The levee slope will then be covered with 2-3 inches of weed-free straw held in place with an organic tackifier.

E. SCHEDULE

Appendix 5 contains the project schedule for implementation of the flood control project and the mitigation project. According to current estimates the construction of flood control improvements will be completed by late 1995 and mitigation site installation will be completed by late 1997.

F. IRRIGATION PLAN

No irrigation of the mitigation site will be necessary, as regular tidal inundation will occur.

G. AS-BUILT CONDITIONS

A plan which describes the "as-built" status of the mitigation site will be submitted to the Corps within 10 weeks of completion of site preparation and planting. Reports for grading and planting shall be submitted separately, as current plans require that the planting and grading be completed more than 6 weeks apart. Any deviations from the final mitigation plans shall be clearly marked on the as-built plan set. The as-built plans shall show the actual post-grading spot elevations of the mitigation area and the areas of all plant and seed installation. Individual plant locations do not need to be indicated, but the limits of each plant association shall be accurately identified. An aerial photograph will be taken following site planting and will be underlain with the as-built plans. Elevations of the mitigation bench will be verified and plotted on the as-built plans using the aerial photograph. The plans will also show the location and direction for all photo-documentation monitoring.

VI. MAINTENANCE DURING MONITORING PERIOD

A. MAINTENANCE ACTIVITIES

Maintenance of positive drainage patterns in the mitigation bench is essential. Should ponding of brackish water occur, the result would be a build up of excessive salt residue which would be harmful to mitigation plants. Strategic placement of additional drainage cuts may be required after completion of construction in order to maintain drainage patterns. However, hand and mechanical placement of drainage cuts through the existing marsh should be minimized.

Required maintenance of the plantings will be minimal. Contingency measures, as discussed in Chapter IX of this document, will be initiated if the cover of non-native species, including peppergrass, exceeds one percent. All control measures, including the use of herbicides, will cease two years prior to the expected attainment of final success criteria.

The only other maintenance activity which might occur is replanting in the event that the initial plantings fail. Replanting would be a possible contingency as discussed in Chapter IX of this document.

B. RESPONSIBLE PARTIES

The person responsible for implementing maintenance activities is:

Dr. Bernard Goldner
Environmental Section, Project Development Branch
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

telephone (408) 927-0710

C. SCHEDULE

The site shall be monitored monthly during the period following site preparation and preceding plant installation. This monitoring will indicate if weed removal is necessary, as described in Section V.C. Following plant installation, maintenance will only be undertaken if annual monitoring shows that the site is not meeting the performance criteria (see Section VII.A).

VII. MONITORING PLAN

A. PERFORMANCE CRITERIA

Plants

The performance standards for native plant species percent cover by the two plant associations will be the following:

Alkali Bulrush Association:

Year 1	20%
Year 2	35%
Year 3	50%
Year 4	70%
Year 5	80%

Transition Zone Association:	Overstory	Understory
Year 1	5%	15%
Year 2	10%	25%
Year 3	15%	35%
Year 4	20%	45%
Year 5	25%	50%

These performance standards apply only to native marsh plant species. If the success criteria are not met in Years 1-5, remedial action will be required (see Chapter IX). Remedial action would entail removing non-natives and/or replanting with native species. Percent cover by non-native species, such as broad leaf pepper-grass, will be monitored. If broad leaf pepper-grass cover exceeds an average of 1% in the alkali bulrush zone or 25% in the transition zone, a control program will be triggered (see Chapter IX). It should be noted that broad leaf pepper-grass cover was 1% in the alkali bulrush reference area and 55% in the transition zone reference area. Thus, some occurrence of this non-native species is expected in the transition zone of the mitigation area. If broad leaf pepper-grass is observed to invade the alkali bulrush reference area at elevations similar to those of the mitigation site's alkali bulrush area then the District will confer with the Corps to determine if eradication measures are required.

Sediment

The performance standard for sedimentation will be 0.50 foot per year. Contingency measures will be initiated if sedimentation occurs at a slower rate.

Vertebrate Wildlife

The progress of restoration will be judged by the gradual re-establishment of breeding territories for marsh birds. Specific species will be Salt Marsh Yellowthroat and Marsh Wren. Breeding surveys will be conducted annually to compare reference and restoration sites over time. A trend toward the successful re-establishment of breeding territories comparable to the reference site will indicate restoration success.

Bird species composition will change gradually, through time, as the marsh develops. During the first several years, when the area comprises mudflats followed by early vegetation generation, the area will be suitable for shorebirds and waders. Examples of species that can be expected to utilize this habitat in early successional stages (approximately years 1-2) include: various species of herons and egrets (as listed in Section I.E.2), Black-bellied Plover, Killdeer, Black-necked Stilt, American Avocet, Greater and Lesser Yellowlegs, Willet, Spotted, Western and Least Sandpipers, Long-billed Curlew, Marbled Godwit, Dunlin, Short- and Long-billed Dowitchers and Common Snipe. As vegetation matures, smaller shorebirds such as sandpipers will cease using the area. As the marsh vegetation matures towards year 5, most of the larger shorebirds (e.g., curlews, godwits etc.) will also cease using the habitat and it will become occupied primarily by marsh-associated species (as listed above).

Invertebrates

At the time of plant installation, the soils of the mitigation area are expected to contain foraminiferans, oligochaetes, nematodes, colembola, dipteran larvae and coleopteran larvae. The remaining invertebrates listed in Appendix 4 are expected to colonize gradually as the vegetation becomes established. By year 5, the full complement of invertebrates found in the reference area should be present. No monitoring of invertebrates is proposed.

B. MONITORING METHODS

Vegetation

Vegetation establishment at the mitigation site will be monitored over a 5 year period following planting. Monitoring will be conducted in August of each year and will consist of measuring percent cover of the mitigation site using the line intercept method. Table 2 shows the proposed monitoring schedule.

TABLE 2

MONITORING SCHEDULE

BRACKISH MARSH HABITAT MITIGATION AREA
CALABAZAS CREEK

MONITORING TASK	Nov. 95 - Jan. 97	Jan. 1996	Feb.-Apr. 1997	1997	1998	1999	2000	2001
Site Monitoring Between Grading & Planting	X							
As-built Grading Plans		X						
As-built Planting Plans			X					
Non-native Plant Establishment	X	X	X					
Percent Cover- Vegetation*				X	X	X	X	X
Vertebrate Wildlife				X	X	X	X	X
Photo-documentation			X	X	X	X	X	X

* Vegetation monitoring will be conducted in August of each year.

Percent cover will be measured using systematically placed, fixed, line intercept transects. Transects will be repeated twenty times in each plant association to cover approximately 20% of the site. Transects will be run both longitudinally and transversely. The transverse transects will bisect the longitudinal transects and will be of equal length. Appendix 6 contains samples of the data sheets which will be used to record percent cover measurements in the field.

Photographs shall be taken during each monitoring year. Each year, they shall be taken from the same vantage points and in the same direction. The as-built plans shall show the photo-documentation locations and directions. Photographs of sampling quadrants shall be included.

Sediment

Sedimentation will be monitored by permanent staff gages fixed in the center of Alkali Bulrush Mitigation zone at intervals of 500 feet on center. The gages will be no higher than 1 foot above the projected sediment level.

Vertebrate Wildlife

The reference and mitigation sites will be surveyed for the Salt Marsh Yellowthroat and the Marsh Wren during the breeding season. The surveys should occur in June to eliminate confusion with other subspecies of Common Yellowthroat that migrate through and winter in the area. Spot mapping is a widely used, standardized technique that enables the observer to count the number of territories in an area and estimate densities within a defined area (see Ralph et al. 1992). These surveys will involve mapping the locations of all Salt Marsh Yellowthroats and/or Marsh Wrens detected visually or audially during surveys. The locations of observed individuals of these species will be plotted on site maps. Surveys will comprise a minimum of eight visits to both sites during the breeding season and will occur between 05:00 and 10:00 hrs. Site visits should be distributed throughout the month of June.

C. ANNUAL REPORTS

Yearly monitoring results shall be presented in annual reports. These reports shall assess the attainment of yearly performance criteria and progress toward final success criteria. Each monitoring report shall include a list of names, titles, and companies of all persons who prepared the report and participated in the monitoring activities. The reports shall include a copy of the Corps permit and any special conditions, and subsequent letters of modifications as an appendix. The analysis of all quantitative monitoring data will also be included in the reports. Monitoring photographs and maps identifying the monitoring areas, transects, planting zones, etc. shall also be included as appropriate. The Corps permit number shall be cited on the cover page of the monitoring report.

Annual reports shall be submitted to the Corps by 1 October of each year. Reports will also be submitted to Cargill Salt, at their request, since their land is used to access the alkali bulrush reference area.

Copies of all field data sheets shall be available for the Corps review upon request.

D. SCHEDULE

Site monitoring shall be tied to the actual, rather than predicted, installation date. The first annual report shall be due the year following plant installation. Vegetation monitoring shall be conducted in August of each year. Table 2 shows the proposed monitoring schedule. Wildlife monitoring will be conducted according to the schedule described in Section VII.B.

VIII. COMPLETION OF MITIGATION

A. NOTIFICATION OF COMPLETION

When the initial monitoring period is complete and if the Santa Clara Valley Water District (District) believes that the final success criteria have been met, the District shall notify the Corps when submitting the annual report that documents this completion. A current jurisdictional delineation of the created wetland area shall be submitted with the report. This delineation shall be accompanied by legible copies of all field data sheets.

B. CORPS CONFIRMATION

Following completion of the report, the Corps may require a site visit to confirm the completion of the mitigation effort and any jurisdictional delineation.

IX. CONTINGENCY MEASURES

A. INITIATING PROCEDURE

If an annual performance criteria or final success criteria is not met, the Santa Clara Valley Water District (District) shall prepare an analysis of the cause(s) of failure and, if determined necessary by the Corps, propose specific remedial action for review by the Corps. After review by the Corps, the District shall take remedial action, as requested by the Corps, to meet the mitigation goals.

If the cover of broad leaf pepper-grass exceeds an average of 1% in the alkali bulrush zone or 25% in the transition zone, contingency measures will be initiated. The District will confer with the Corps to determine appropriate eradication measures.

One possible program for the control of broad leaf pepper-grass would be a multi-tiered process. First, areas that contain peppergrass will be spray irrigated with brackish waters to form salt deposits on foliage. This method is expected to result in plant fatality after prolonged exposure (21 days). Should the salt spray method be ineffective, conventional weed control techniques will be utilized. Rodeo (glyphosate) will be used strictly in compliance with the manufacturer's label, at rates no higher than 1.5 percent. Application will be by knapsack sprayer, or if desirable marsh plants are growing within 6 inches of weeds, by wick type applicators which apply herbicide to the leaf surface by sponges and thus avoid any potential for drift. Only approved surfactant will be used. Herbicide will be applied directly to target plants when they are small, preferably less than 12 inches tall, and when the plants are actively growing. Although Rodeo is approved for use in aquatic sites, application at this site will be limited to periods of low tide when flows are confined to the channel (well away from the mitigation area). Herbicides will not be applied under windy conditions (greater than 5 miles per hour). The application of the herbicide will be repeated, as needed, to control growth from underground parts or seed.

B. ALTERNATIVE LOCATIONS FOR CONTINGENCY MITIGATION

The mitigation site proposed can reasonably be expected to be a suitable environment for creating the desired habitat. Therefore, no alternative location has been identified at this time. If monitoring indicates that the site is performing poorly, then use of an alternative site may be recommended as a remedial action.

C. FUNDING MECHANISMS

Any required contingency actions will be funded by the same mechanism used to fund the mitigation installation. This funding consists of existing revenues from property tax allocation and flood control benefit assessments, and debt financing by way of certificates of participation or other borrowing mechanisms.

D. RESPONSIBLE PARTIES

The responsible person for contingency actions is:

Dr. Bernard Goldner
Environmental Section, Project Development Branch
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

telephone (408) 927-0710

REFERENCES CITED

Cameron, G.N., 1972. Analysis of insect trophic diversity in two salt marsh communities. Ecology 53:58-73.

California Fish and Games, 1990. California Natural Diversity Database.

Foster, M.L. 1977. A breeding season study of Salt Marsh Yellowthroat (*Geothypis trichas sinuosa*) of San Francisco Bay Area, California. Thesis, San Jose State University, 77pp.

George, H. A. n.d. Planting alkali bulrush for waterfowl food. California Department of Fish and Game, Game Management Leaflet No. 9.

Habitat Restoration Group. 1989. Calabazas Creek Planning Study, Highway 101 to Guadalupe Slough, Fishery Assessment, File No. 387-03.

Habitat Restoration Group. 1991. Calabazas Creek Preliminary Wetlands Determination, 2/11/91.

Hobson, K. P. Perrine, E.B. Roberts, M.L. Foster, P. Woodin. 1986. A breeding season survey of Salt Marsh Yellowthroats (*Geothypis trichas sinuosa*) in the San Francisco Bay Region. U.S. Fish and Wildlife Service, Sacramento, CA. 93pp.

H. T. Harvey and Associates. 1985. Baseline HEP Analysis Sammis Company Property Moffett Technology Center.

H. T. Harvey and Associates. 1988. Calabazas Creek Salt Marsh Harvest Mouse Survey.

H. T. Harvey and Associates. 1989a. California Clapper Rail breeding surveys, South San Francisco Bay. 39 pp.

H. T. Harvey and Associates. 1989b. Winter Bird Surveys, Sammis Site, San Jose, Munster Site, Union City, September 1986-April 1987.

H. T. Harvey and Associates. 1989c. Highway 237 Natural Environment Study, Endangered Species Biological Data Reports.

H. T. Harvey and Associates. 1991. Sunnyvale Permit Assistance Program California Clapper Rail breeding survey 1990 and 1991. Guadalupe Slough. 19pp.

Jennings, M. 1992. Personal communication regarding special status amphibians and reptiles.

Phil Williams and Associates Ltd. 1989. Wetland Mitigation Plan For Widening of Highway 237.

Ralph, C. J., G. R. Geupel, P. Pyle, T. E. Martin, D. F. DeSante. 1992. Field methods for monitoring landbirds (draft). USDA Forest Service, Redwood Science, Laboratory, 1700 Bayview Drive, Arcata, Ca 95521.

Rollins, G. L. 1981. A guide to waterfowl habitat management in Suisun Marsh. California Department of Fish and Game. 109 pp.

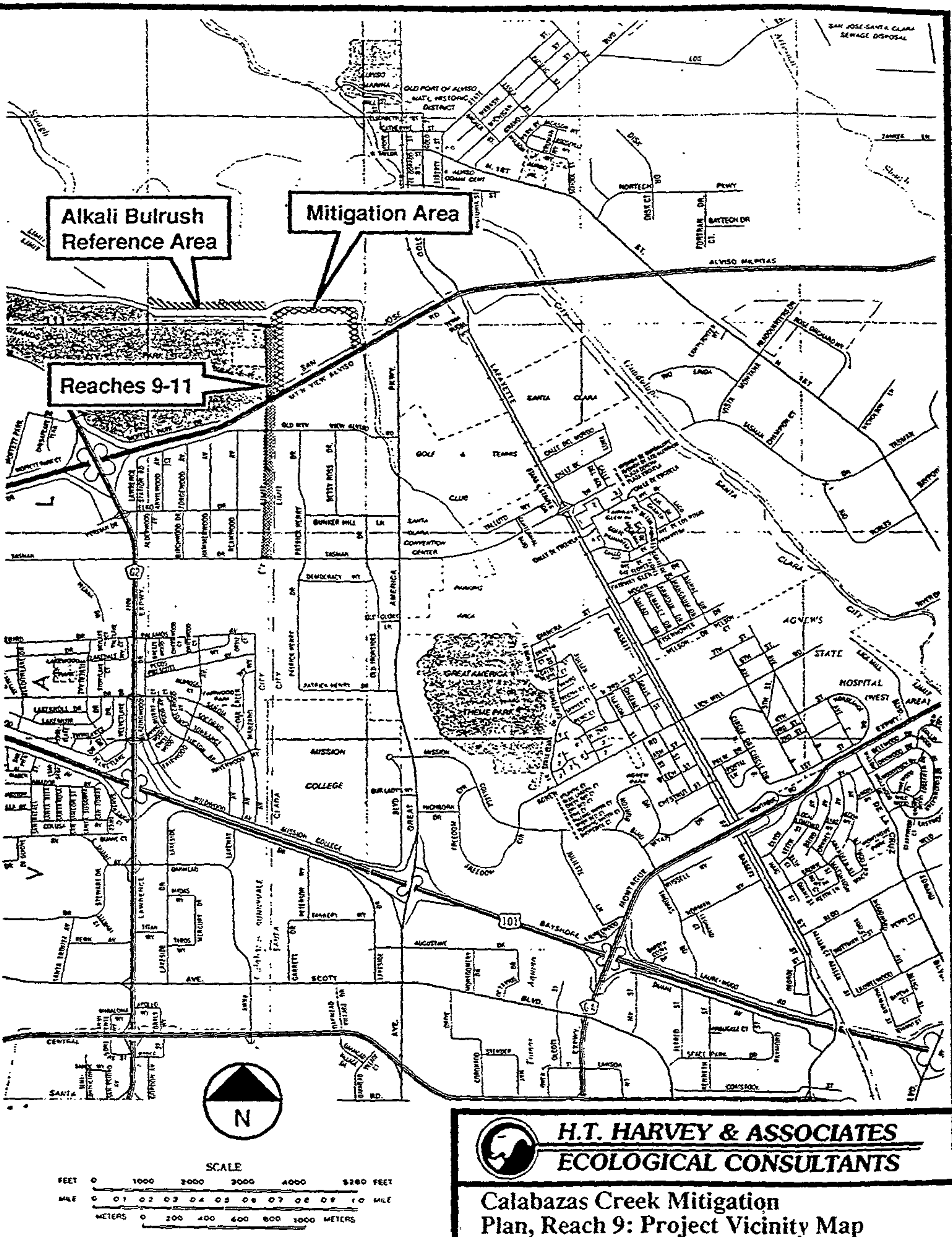
Santa Clara Valley Water District. 1992. Calabazas creek planning study (Guadalupe Slough to Miller Avenue) consisting of the Combined Engineer's Report and Final Environmental Impact Report.

Schawarzbach, S. 1992. U. S. Fish and Wildlife Service, personal communication regarding herbicide use in brackish marshes.

APPENDICES

APPENDIX 1

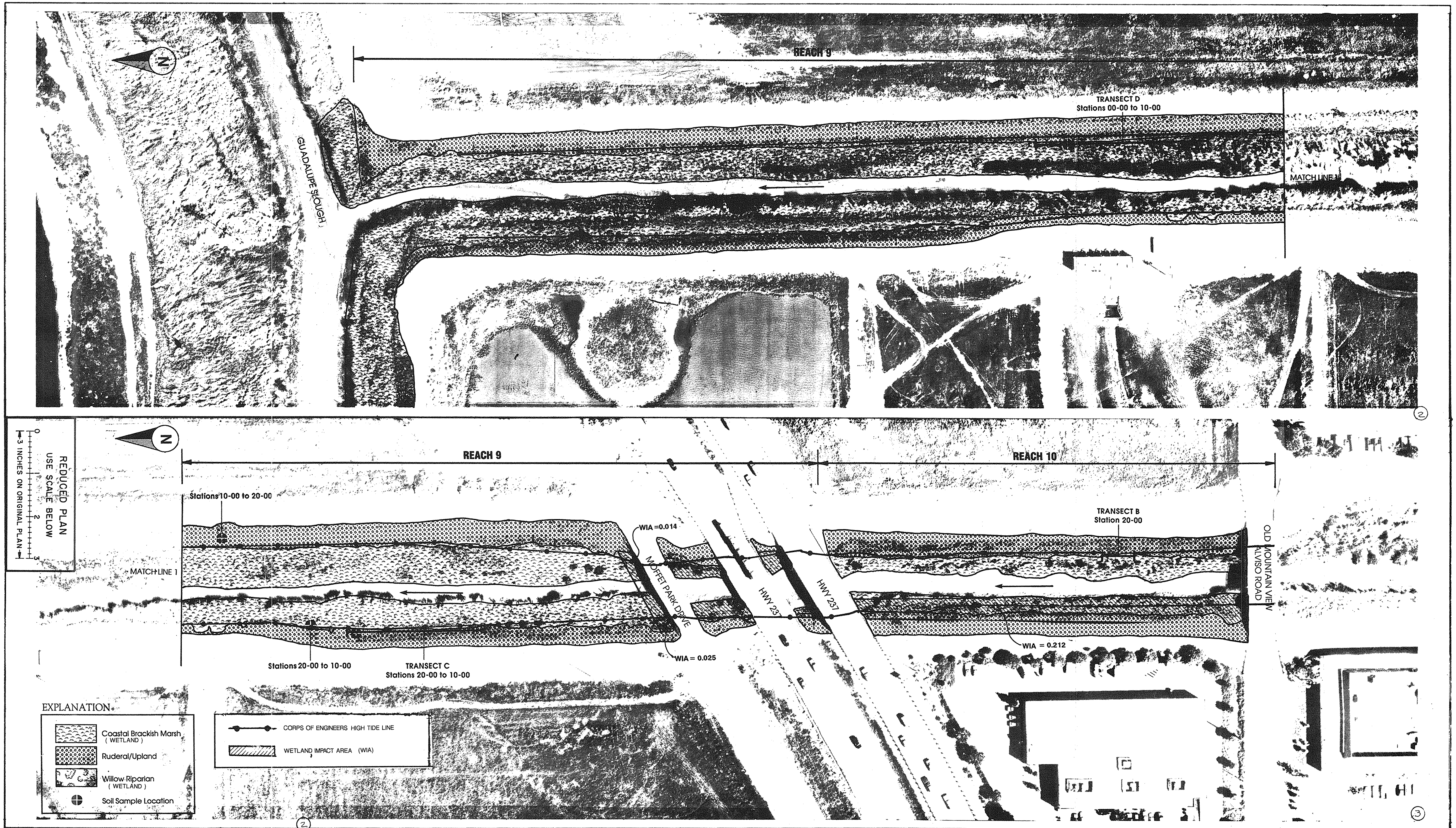
FIGURES


Alkali Bulrush Reference Area
Mitigation Area
Reaches 9-11
SAN JOSE-SANTA CLARA SEWAGE DISPOSAL
ALVISO MARINA
OLD PORT OF ALVISO NAT'L HISTORIC DISTRICT
ALVISO MILPITAS
GOLF & TENNIS CLUB
SANTA CLARA CONVENTION CENTER
GREAT AMERICA THEME PARK
MISSION COLLEGE
AGNEW'S STATE HOSPITAL (WEST AREA)
SANTA CLARA
101
G2
BAYSHORE
N
SCALE
FEET 0 1000 2000 3000 4000 5280 FEET
MILE 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 MILE
METERS 0 200 400 600 800 1000 METERS

H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Calabazas Creek Mitigation Plan, Reach 9: Project Vicinity Map

File No. 672-02 | Date 5/9/92 | Figure 1



REV

CORPS OF ENGINEERS JURISDICTIONAL AREA

COE jurisdiction areas are all those areas shown between high tide lines and adjacent wetlands

DATE OF PREPARATION: 5/90
DATE OF SUBMISSION: 7/92

The Habitat Restoration Group

JOHN STANLEY & ASSOCIATES, INC.
6001 Butler Lane, Suite 1 • Scotts Valley, CA 95066 • (408) 438-4102 FAX (408) 438-1142 • Branch Office • 216 F Street No. 63 • Davis, CA 95616 • (916) 753-3905
California Landscape Contractors License #571037

PHOTOGRAPHY BY: AIR FLIGHT SERVICE
DATE:
RECTIFICATION BY:

5-90
"
CHECKED

Santa Clara Valley Water District

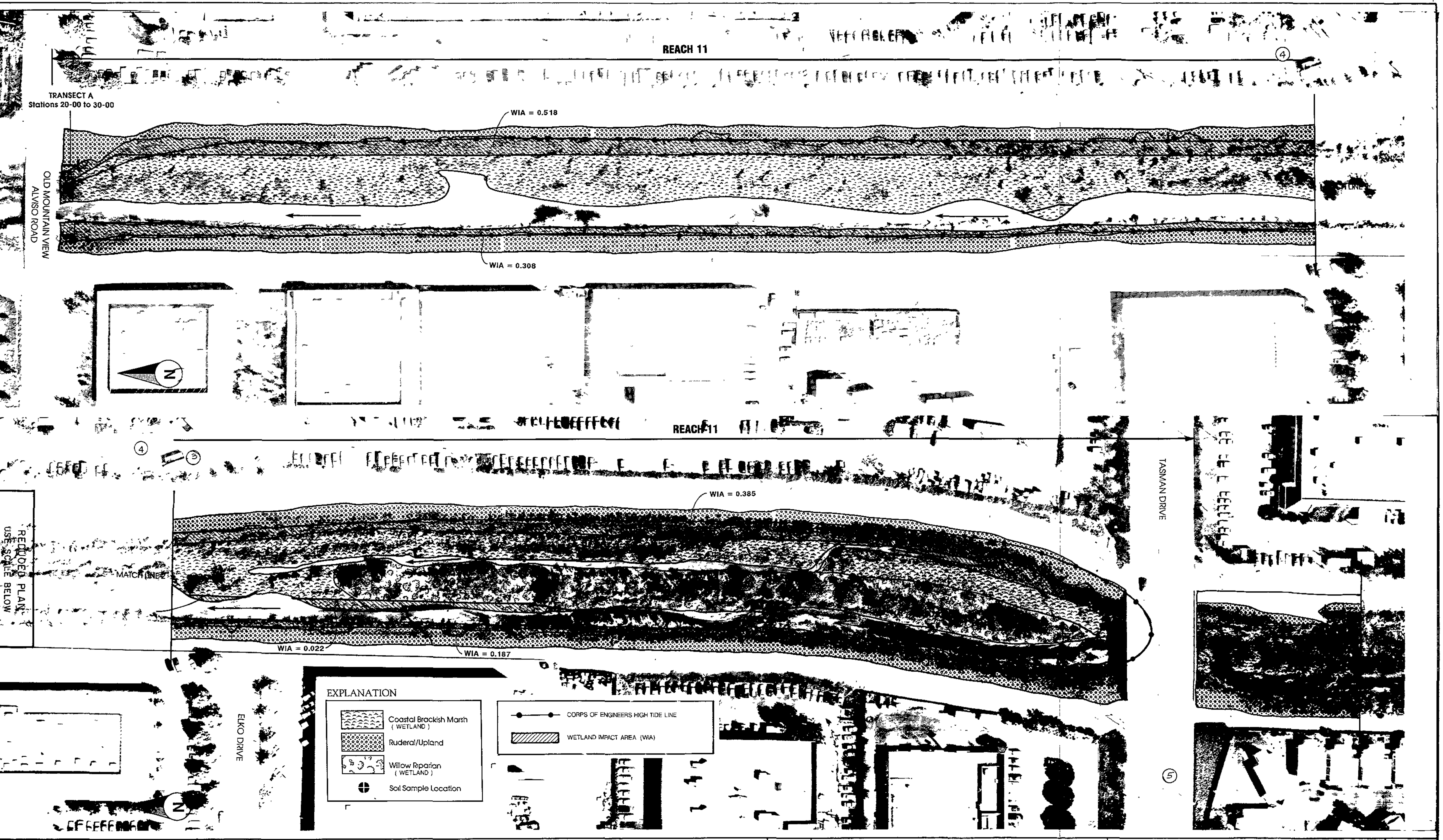
CALABAZAS CREEK
Wetland Delineation
REACH 9 - Guadalupe Slough to Hwy 237
REACH 10 - Hwy 237 to Old Mountain View Rd

FIGURE 2A

1" = 50'

1 of 5

387-04



DESCRIPTION	DATE	APPD
ORPS OF ENGINEERS JURISDICTIONAL AREA OE jurisdiction areas are all those areas shown etween high tide lines and adjacent wetlands ATE OF PREPARATION 5/90 ATE OF SUBMISSION 1/94		

The Habitat Restoration Group

JOHN STANLEY & ASSOCIATES, INC

6001 Butler Lane, Suite 1 • Scotts Valley CA 95066 • (408) 438-4102 FAX (408) 438-1142 • Branch Office • 216 F Street No. 63 • Davis CA 95616 • (916) 753 3905

California Landscape Contractors License #571037

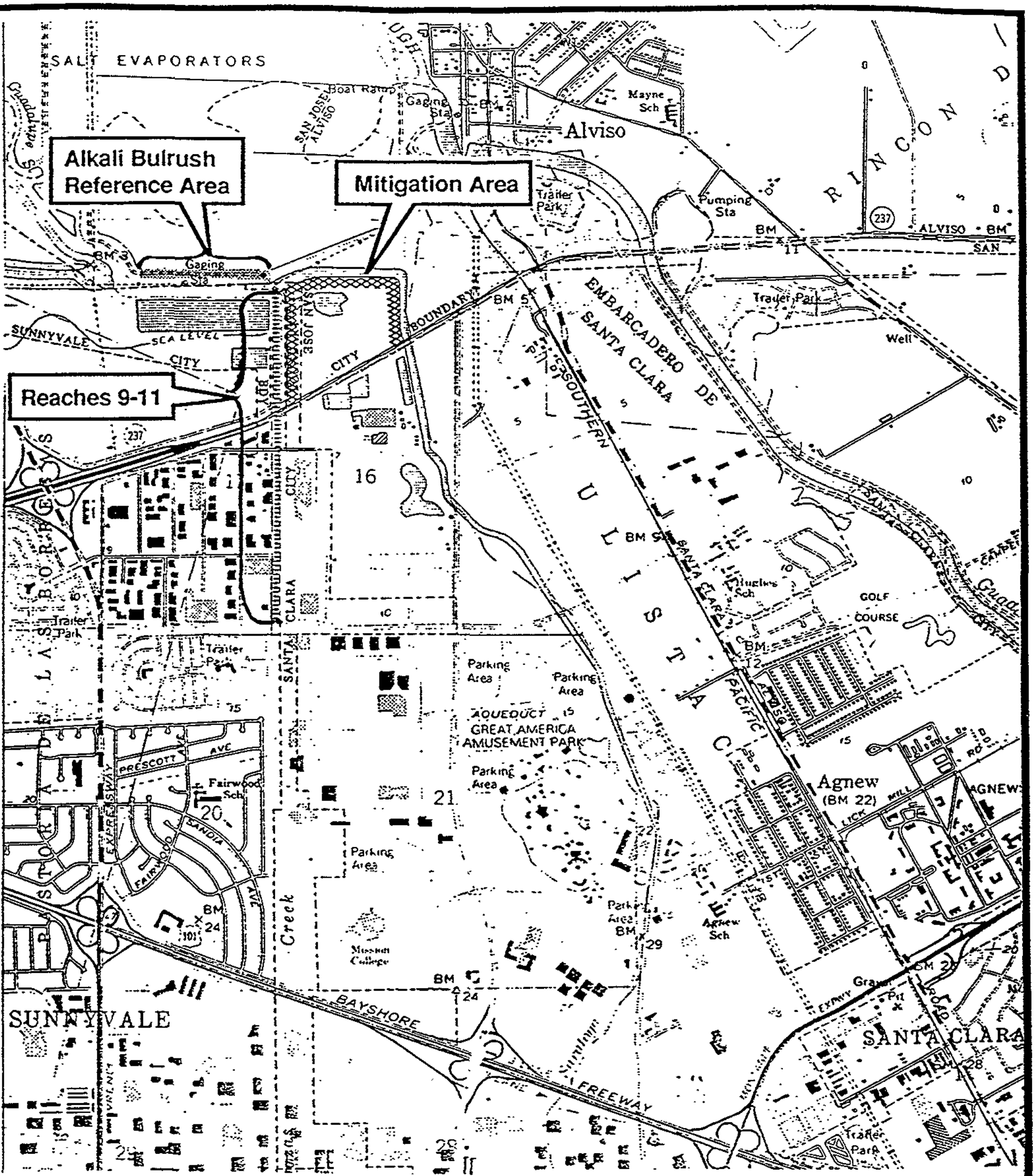
PHOTOGRAPHY BY [illegible] DATE RECTIFICATION BY

DATE 5-90
DESIGN
DRAWN
CHECKED

Santa Clara Valley Water District

CALABAZAS CREEK
Wetland Delineation
REACH 11
Old Mountain View Rd to Tasman Drive
FIGURE 2B

SCALE 1" = 50'
SHEET 2 of 5
317-04

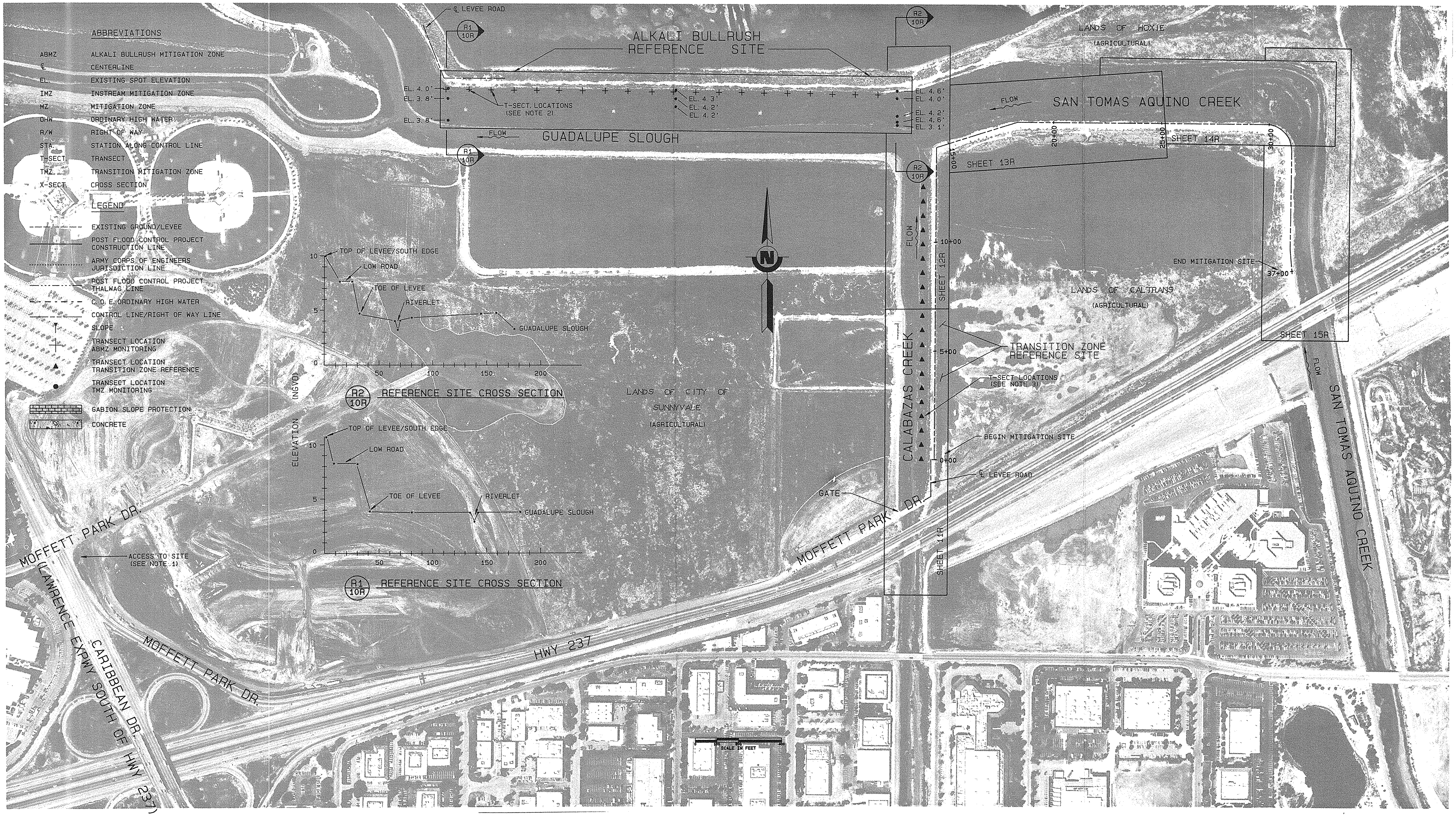


Milpitas Quadrangle
(section) 7.5 Minute Series

H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

USGS Quad Map: Reach 9

File No. 672-02	Date 4/30/92	Figure 3



ABBREVIATIONS

ABMZ	ALKALI BULLRUSH MITIGATION ZONE
℄	CENTERLINE
EL.	EXISTING SPOT ELEVATION
IMZ	INSTREAM MITIGATION ZONE
MZ	MITIGATION ZONE
OHW	ORDINARY HIGH WATER
R/W	RIGHT OF WAY
STA.	STATION ALONG CONTROL LINE
T-SECT.	TRANSECT
TMZ	TRANSITION MITIGATION ZONE
X-SECT.	CROSS SECTION

LEGEND

- - - - -	EXISTING GROUND/LEVEE
———	POST FLOOD CONTROL PROJECT CONSTRUCTION LINE
········	ARMY CORPS OF ENGINEERS JURISDICTION LINE
— · — · —	POST FLOOD CONTROL PROJECT THALWAG LINE
— - - — - -	C.O.E. ORDINARY HIGH WATER
—— — ——	CONTROL LINE/RIGHT OF WAY LINE
⊤	SLOPE
+	TRANSECT LOCATION ABMZ MONITORING
▲	TRANSECT LOCATION TRANSITION ZONE REFERENCE
●	TRANSECT LOCATION TMZ MONITORING
▦	GABION SLOPE PROTECTION
▨	CONCRETE

REV	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES

1. ACCESS TO MITIGATION SITE: FROM CARIBBEAN DRIVE, TURN EAST ON MOFFETT PARK DR. (FRONTAGE ROAD TO HWY 237) AND PROCEED TO GATE AT CALABAZAS CREEK BRIDGE. MITIGATION BEGINS ON EAST SIDE OF BRIDGE 160 FEET NORTH OF CENTER LINE.
2. ALKALI BULLRUSH REFERENCE SITE TRANSECTS ARE LOCATED AT 106 FEET INTERVALS BEGINNING AT THE ANGLE POINT OF THE LEVEE ROAD.
3. TRANSITION ZONE REFERENCE SITE TRANSECTS ARE LOCATED AT 66 FEET INTERVALS BEGINNING 175 FEET NORTH OF THE ANGLE POINT OF MOFFETT PARK DR. AND LEVEE ROAD.
4. DATE OF PREPARATION: 9/93
5. DATE OF SUBMISSION: 1/94

DATE
9/14/93

DESIGN
REILLER

DRAWN
JA

CHECKED

Santa Clara Valley Water District

ENGINEERING CERTIFICATION

PROJECT ENGINEER

ENGINEERING APPROVAL

DIVISION ENGINEER

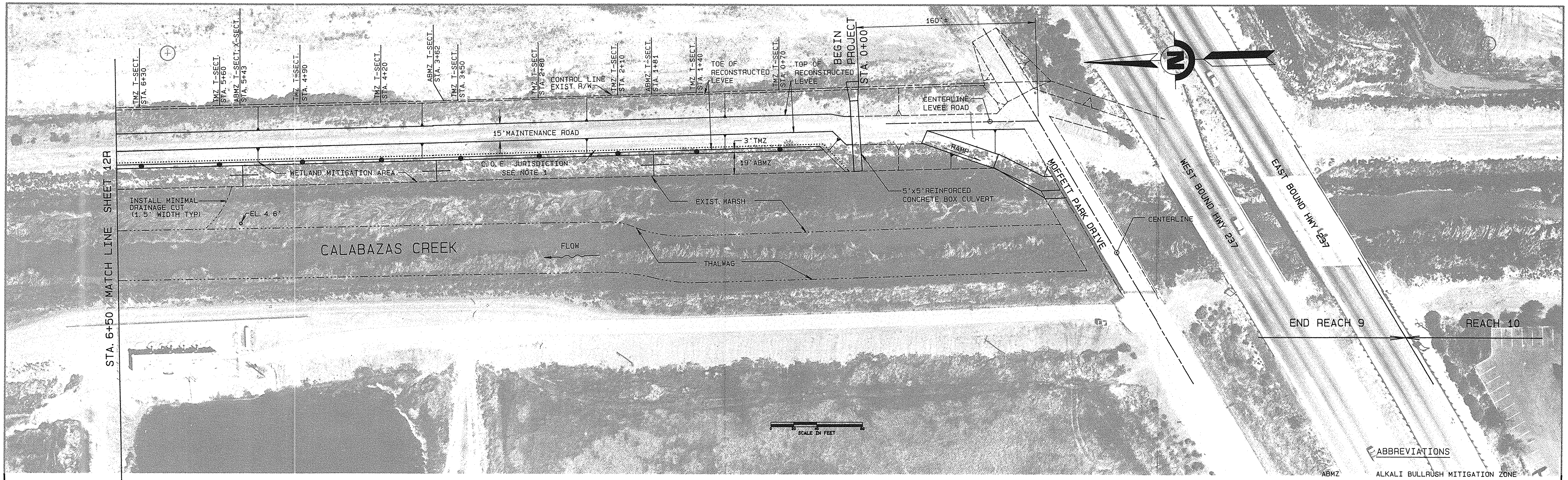
CALABAZAS CREEK

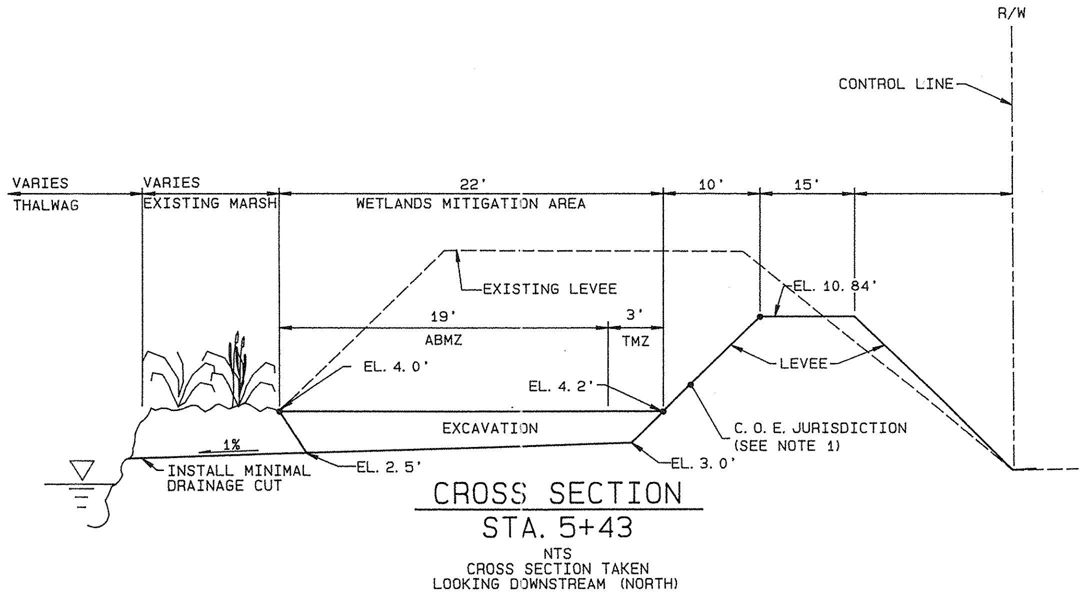
REACH 9 & SAN TOMAS AQUINO CREEK

MITIGATION AND REFERENCE SITE
LOCATION MAP-FIGURE 4

SCALE
1"=200'

SHEET
10R





CROSS SECTION
STA. 5+43

NTS
CROSS SECTION TAKEN
LOOKING DOWNSTREAM (NORTH)

ABBREVIATIONS

ABMZ	ALKALI BULLRUSH MITIGATION ZONE
℄	CENTERLINE
EL.	EXISTING SPOT ELEVATION
IMZ	INSTREAM MITIGATION ZONE
MZ	MITIGATION ZONE
OHW	ORDINARY HIGH WATER
R/W	RIGHT OF WAY
STA.	STATION ALONG CONTROL LINE
T-SECT.	TRANSECT
TMZ	TRANSITION MITIGATION ZONE
X-SECT.	CROSS SECTION

LEGEND

– – – – –	EXISTING GROUND/LEVEE
———	POST FLOOD CONTROL PROJECT CONSTRUCTION LINE
··········	ARMY CORPS OF ENGINEERS JURISDICTION LINE
—··—··—	POST FLOOD CONTROL PROJECT THALWAG LINE
—·—·—	C. O. E. ORDINARY HIGH WATER
—— — ——	CONTROL LINE/RIGHT OF WAY LINE
⊤	SLOPE
+	TRANSECT LOCATION ABMZ MONITORING
▲	TRANSECT LOCATION TRANSITION ZONE REFERENCE
●	TRANSECT LOCATION TMZ MONITORING
▦	GABION SLOPE PROTECTION
▨	CONCRETE

REV	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES
1. ARMY CORPS OF ENGINEEERS JURISDICTION. HIGH TIDE = 5.97 NGVD.
2. DATE OF PREPARATION: 9/93
3. DATE OF SUBMISSION: 1/94

DATE	9/14/93
DESIGN	KR
DRAWN	SL/JA
CHECKED	CR

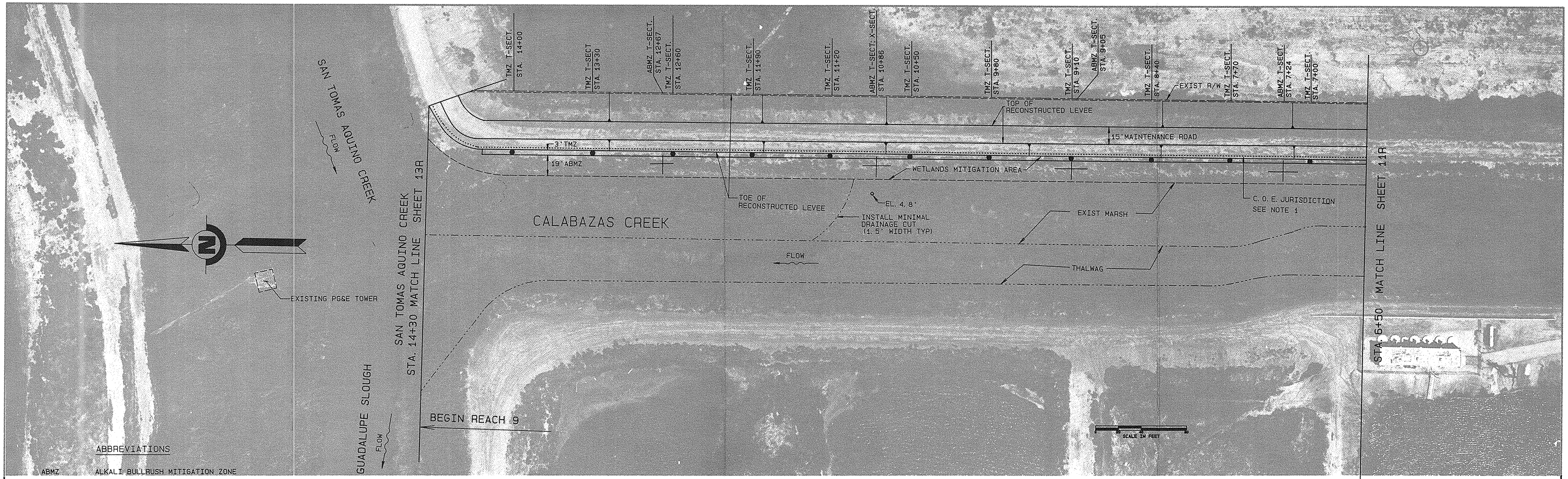
Santa Clara Valley Water District

ENGINEERING CERTIFICATION
PROJECT ENGINEER

ENGINEERING APPROVAL
DIVISION ENGINEER

CALABAZAS CREEK
REACH 9 & SAN TOMAS AQUINO CREEK
FIGURE 5A

SCALE
AS SHOWN
SHEET
11R

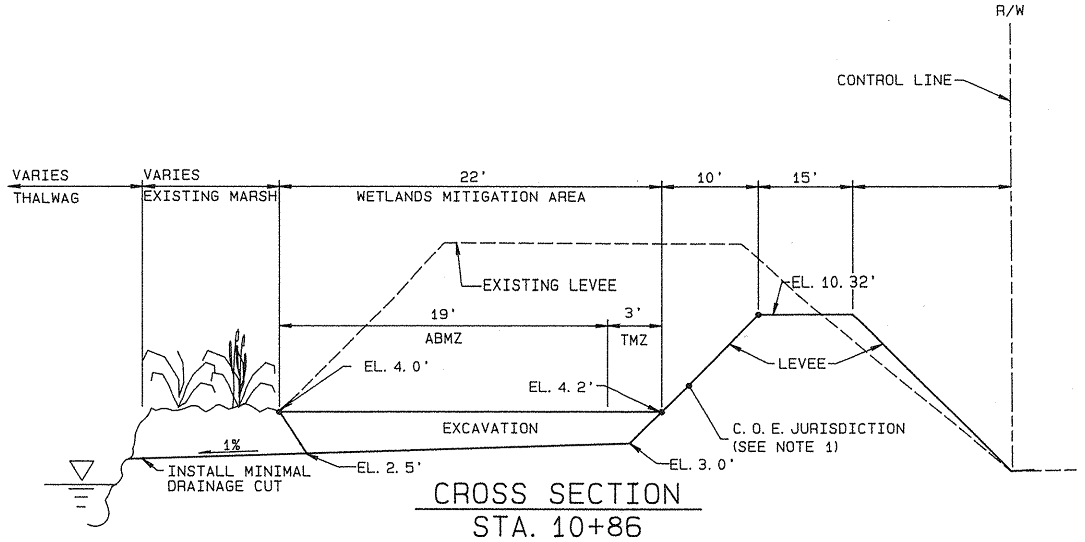


ABBREVIATIONS

ABMZ	ALKALI BULLRUSH MITIGATION ZONE
℄	CENTERLINE
EL.	EXISTING SPOT ELEVATION
IMZ	INSTREAM MITIGATION ZONE
MZ	MITIGATION ZONE
OHW	ORDINARY HIGH WATER
R/W	RIGHT OF WAY
STA.	STATION ALONG CONTROL LINE
T-SECT.	TRANSECT
TMZ	TRANSITION MITIGATION ZONE
X-SECT.	CROSS SECTION

LEGEND

- - - - - - - -	EXISTING GROUND/LEVEE
———————	POST FLOOD CONTROL PROJECT CONSTRUCTION LINE
…………………	ARMY CORPS OF ENGINEERS JURISDICTION LINE
—··—··—··	POST FLOOD CONTROL PROJECT THALWAG LINE
— - — - — -	C. O. E. ORDINARY HIGH WATER
—— —— ——	CONTROL LINE/RIGHT OF WAY LINE
⊤	SLOPE
+	TRANSECT LOCATION ABMZ MONITORING
▲	TRANSECT LOCATION TRANSITION ZONE REFERENCE
●	TRANSECT LOCATION TMZ MONITORING
▦	GABION SLOPE PROTECTION
▨	CONCRETE



CROSS SECTION
STA. 10+86
NTS
CROSS SECTION TAKEN
LOOKING DOWNSTREAM (NORTH)

REV	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 ←3 INCHES ON ORIGINAL PLAN→		

REFERENCE INFORMATION AND NOTES
1. ARMY CORPS OF ENGINEERS JURISDICTION. HIGH TIDE = 5.97 NGVD.
1. DATE OF PREPARATION: 9/93
1. DATE OF SUBMISSION: 1/94

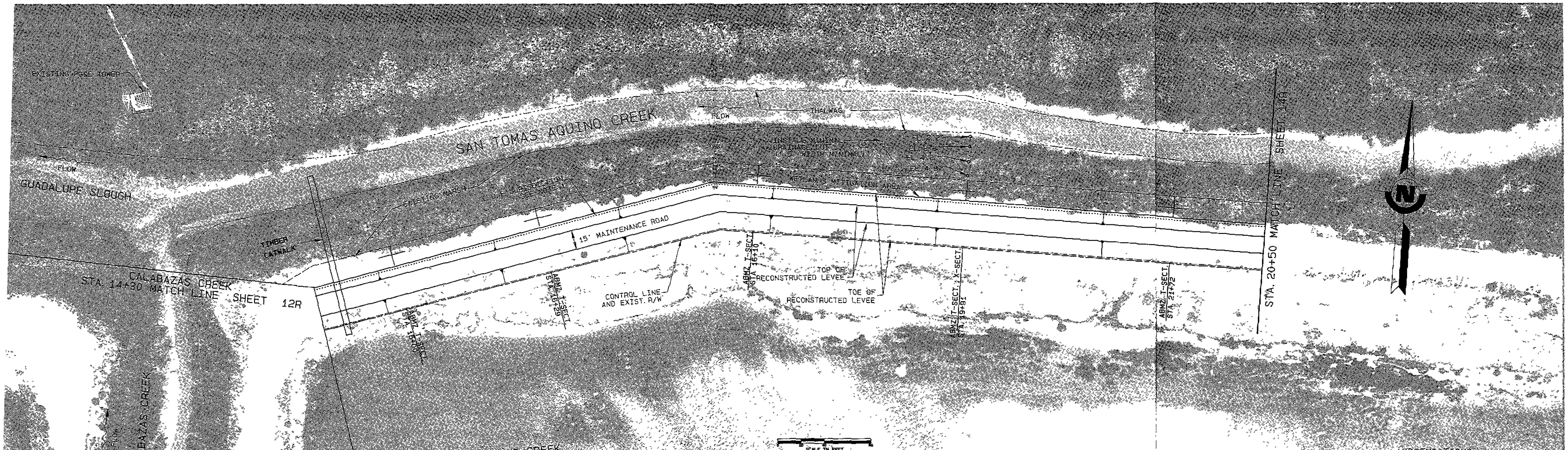
DATE 9/14/93
DESIGN KR
DRAWN SL/JA
CHECKED CR

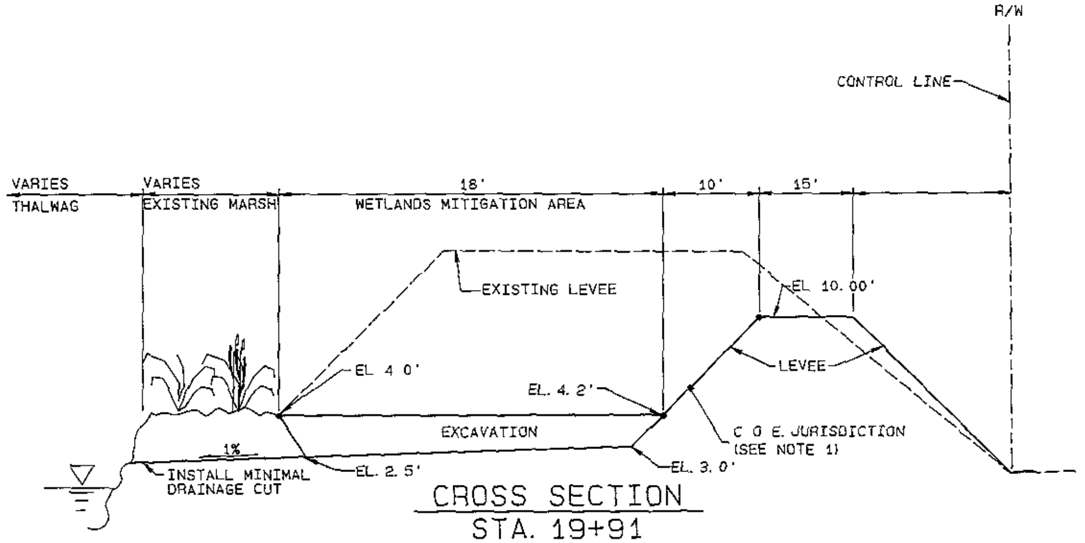
Santa Clara Valley Water District

ENGINEERING CERTIFICATION
PROJECT ENGINEER
ENGINEERING APPROVAL
DIVISION ENGINEER

CALABAZAS CREEK
REACH 9 & SAN TOMAS AQUINO CREEK
FIGURE 5B

SCALE AS SHOWN
SHEET 12R


EXISTING PG&E TOWER
FLOW
GUADALUPE SLOUGH
SAN TOMAS AQUINO CREEK
FLOW
THALWAG
INSTALL MINIMAL DRAINAGE CUT (1.5' WIDTH MINIMAL)
EL. 2.2
EL. 2.8
EL. 4.2
EL. 4.8
WETLANDS MITIGATION AREA
EXISTING MARSH
C.O.E. JURISDICTION SEE NOTE 1
TIMBER CATWALK
15' MAINTENANCE ROAD
CALABAZAS CREEK STA. 14+30 MATCH LINE SHEET 12R
ABMZ T-SECT STA. 15+00
ABMZ T-SECT STA. 16+29
CONTROL LINE AND EXIST. R/W
ABMZ T-SECT STA. 16+10
TOP OF RECONSTRUCTED LEVEE
TOE OF RECONSTRUCTED LEVEE
ABMZ T-SECT, X-SECT STA. 19+91
ABMZ T-SECT STA. 21+72
STA. 20+50 MATCH LINE SHEET 14R
N
CALABAZAS CREEK
FLOW
BEGIN SAN TOMAS AQUINO CREEK
SCALE IN FEET



CROSS SECTION
STA. 19+91

NTS
CROSS SECTION TAKEN
LOOKING DOWNSTREAM (NORTH)

ABBREVIATIONS

ABMZ	ALKALI BULLRUSH MITIGATION ZONE
℄	CENTERLINE
EL.	EXISTING SPOT ELEVATION
IMZ	INSTREAM MITIGATION ZONE
MZ	MITIGATION ZONE
OHW	ORDINARY HIGH WATER
R/W	RIGHT OF WAY
STA	STATION ALONG CONTROL LINE
T-SECT.	TRANSECT
TMZ	TRANSITION MITIGATION ZONE
X-SECT	CROSS SECTION

LEGEND

- - - - - -	EXISTING GROUND/LEVEE
————	POST FLOOD CONTROL PROJECT CONSTRUCTION LINE
············	ARMY CORPS OF ENGINEERS JURISDICTION LINE
—··—··—	POST FLOOD CONTROL PROJECT THALWAG LINE
—·—·—	C.O.E. ORDINARY HIGH WATER
—— ——	CONTROL LINE/RIGHT OF WAY LINE
⊤	SLOPE
+	TRANSECT LOCATION ABMZ MONITORING
▲	TRANSECT LOCATION TRANSITION ZONE REFERENCE
●	TRANSECT LOCATION TMZ MONITORING
▨	GABION SLOPE PROTECTION
▨	CONCRETE

V	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES

1. ARMY CORPS OF ENGINEERS JURISDICTION. HIGH TIDE = 5.97 NGVD
2. DATE OF PREPARATION: 9/93
3. DATE OF SUBMISSION: 1/94

DATE 9/14/93
DESIGN KR
DRAWN SL/JA
CHECKED CR

Santa Clara Valley Water District

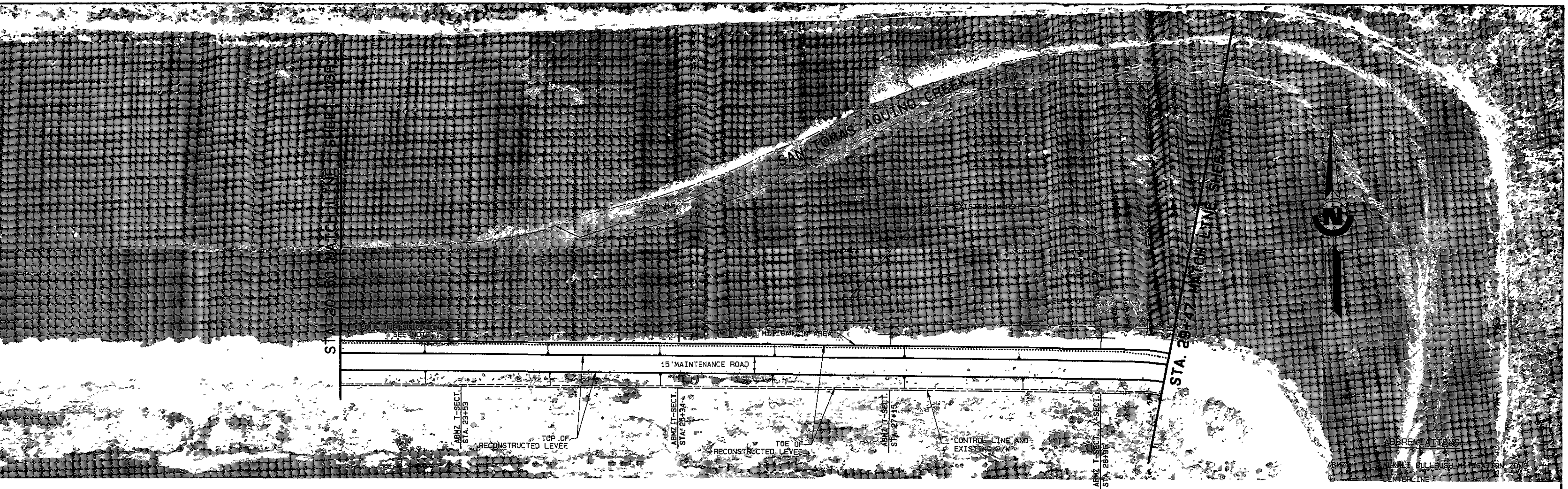
ENGINEERING CERTIFICATION
PROJECT ENGINEER

ENGINEERING APPROVAL
DIVISION ENGINEER

CALABAZAS CREEK
REACH 9 & SAN TOMAS AQUINO CREEK

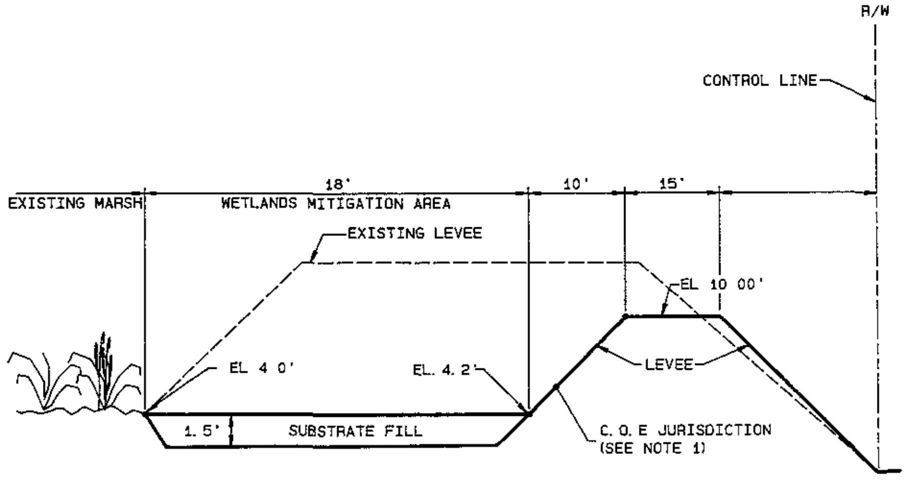
FIGURE 5C

SCALE
AS SHOWN
SHEET
13R



ABBREVIATIONS

ABMZ	ALKALI BULLRUSH MITIGATION ZONE
℄	CENTERLINE
EL	EXISTING SPOT ELEVATION
IMZ	INSTREAM MITIGATION ZONE
MZ	MITIGATION ZONE
OHW	ORDINARY HIGH WATER
R/W	RIGHT OF WAY
STA.	STATION ALONG CONTROL LINE
T-SECT	TRANSECT
TMZ	TRANSITION MITIGATION ZONE
X-SECT	CROSS SECTION



CROSS SECTION
STA. 28+96
NTS
CROSS SECTION TAKEN
LOOKING UPSTREAM (EAST)

LEGEND

- - - - - - -	EXISTING GROUND/LEVEE
———	POST FLOOD CONTROL PROJECT CONSTRUCTION LINE
....	ARMY CORPS OF ENGINEERS JURISDICTION LINE
—··—··—	POST FLOOD CONTROL PROJECT THALWAG LINE
— · — · —	C. O. E ORDINARY HIGH WATER
———	CONTROL LINE/RIGHT OF WAY LINE
T	SLOPE
+	TRANSECT LOCATION ABMZ MONITORING
▲	TRANSECT LOCATION TRANSITION ZONE REFERENCE
●	TRANSECT LOCATION TMZ MONITORING
▦	GABION SLOPE PROTECTION
▨	CONCRETE

DESCRIPTION	DATE	APPR
REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES
1. ARMY CORPS OF ENGINEERS JURISDICTION. HIGH TIDE = 5. 97 NGVD.
2. DATE OF PREPARATION: 5/92
3 DATE OF SUBMISSION. 7/92

DATE	6/16/92
DESIGN	KR
DRAWN	SL/JA
CHECKED	CR

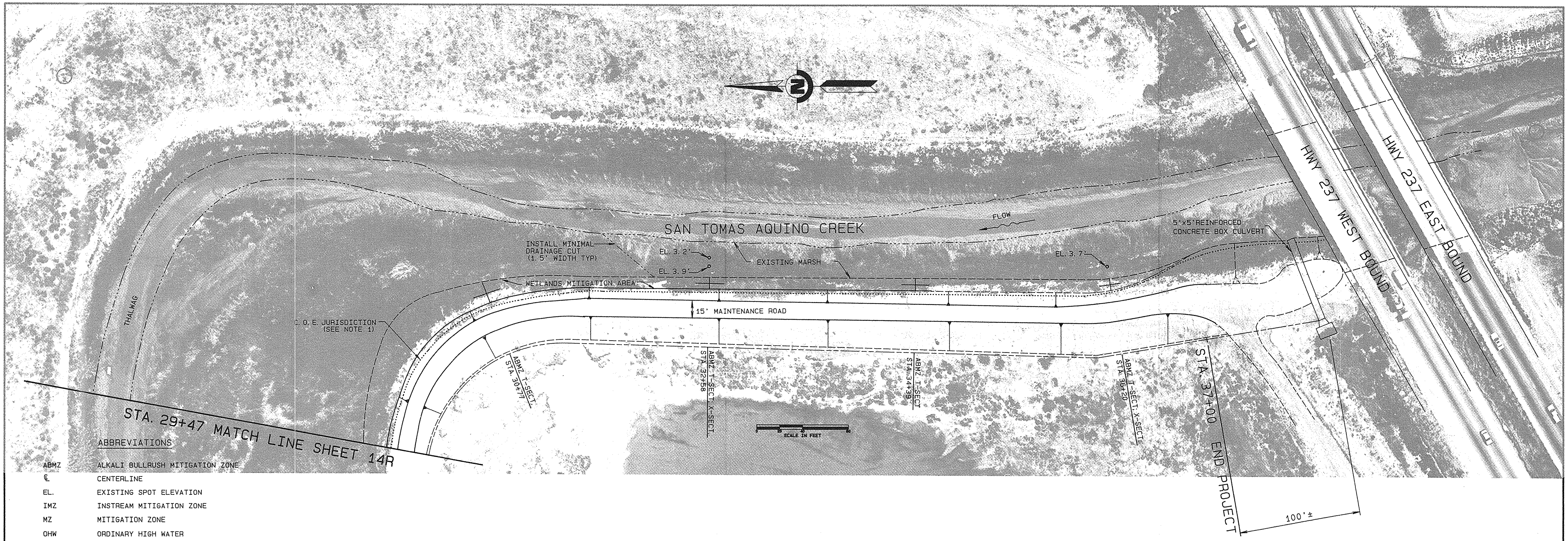
Santa Clara Valley Water District

ENGINEERING CERTIFICATION
PROJECT ENGINEER

ENGINEERING APPROVAL
DIVISION ENGINEER

CALABAZAS CREEK
REACH 9 & SAN TOMAS AQUINO CREEK
FIGURE 5D

SCALE
AS SHOWN
SHEET
14R

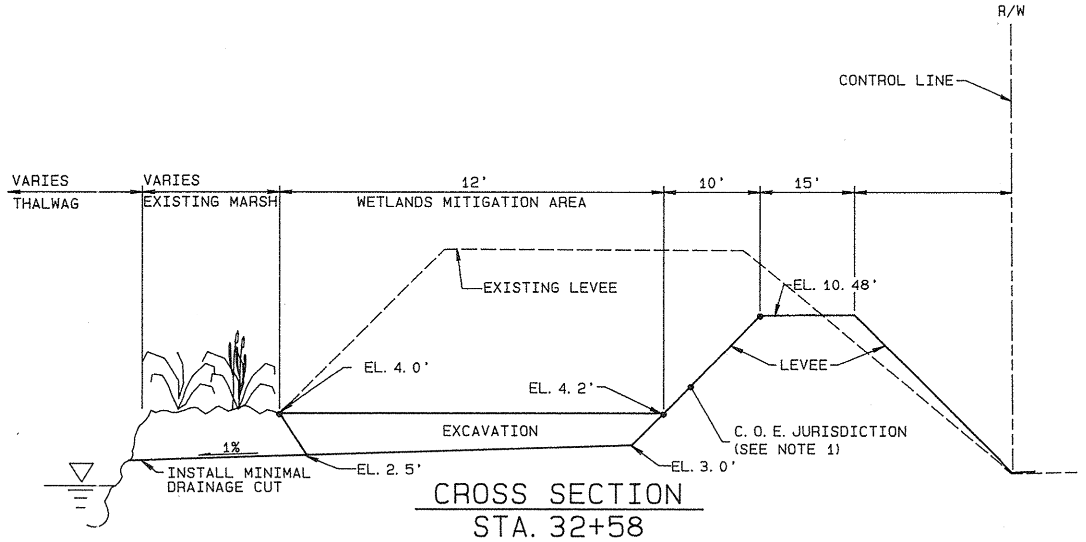


ABBREVIATIONS

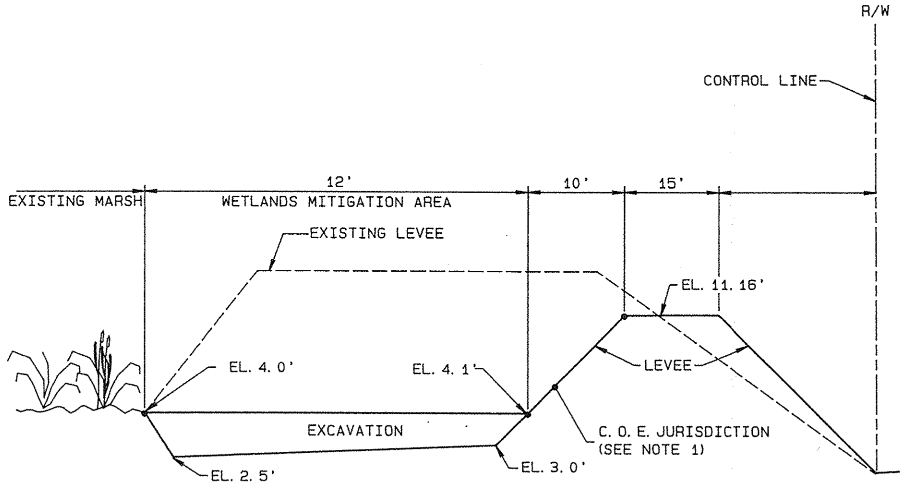
ABMZ	ALKALI BULLRUSH MITIGATION ZONE
℄	CENTERLINE
EL.	EXISTING SPOT ELEVATION
IMZ	INSTREAM MITIGATION ZONE
MZ	MITIGATION ZONE
OHW	ORDINARY HIGH WATER
R/W	RIGHT OF WAY
STA.	STATION ALONG CONTROL LINE
T-SECT.	TRANSECT
TMZ	TRANSITION MITIGATION ZONE
X-SECT.	CROSS SECTION

LEGEND

- - - - - - -	EXISTING GROUND/LEVEE
———————	POST FLOOD CONTROL PROJECT CONSTRUCTION LINE
··············	ARMY CORPS OF ENGINEERS JURISDICTION LINE
—··—··—	POST FLOOD CONTROL PROJECT THALWAG LINE
— - — - —	C. O. E. ORDINARY HIGH WATER
———— ———	CONTROL LINE/RIGHT OF WAY LINE
┳	SLOPE
+	TRANSECT LOCATION ABMZ MONITORING
▲	TRANSECT LOCATION TRANSITION ZONE REFERENCE
●	TRANSECT LOCATION TMZ MONITORING
▤	GABION SLOPE PROTECTION
⁘	CONCRETE



CROSS SECTION
STA. 32+58
NTS
CROSS SECTION TAKEN
LOOKING DOWNSTREAM (NORTH)



CROSS SECTION
STA. 36+20
NTS
CROSS SECTION TAKEN
LOOKING UPSTREAM (SOUTH)

REV	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES
1. ARMY CORPS OF ENGINEERS JURISDICTION. HIGH TIDE = 5.97 NGVD.
2. DATE OF PREPARATION: 9/93
3. DATE OF SUBMISSION: 1/94

DATE 9/14/93
DESIGN KR
DRAWN JA/SL
CHECKED CR

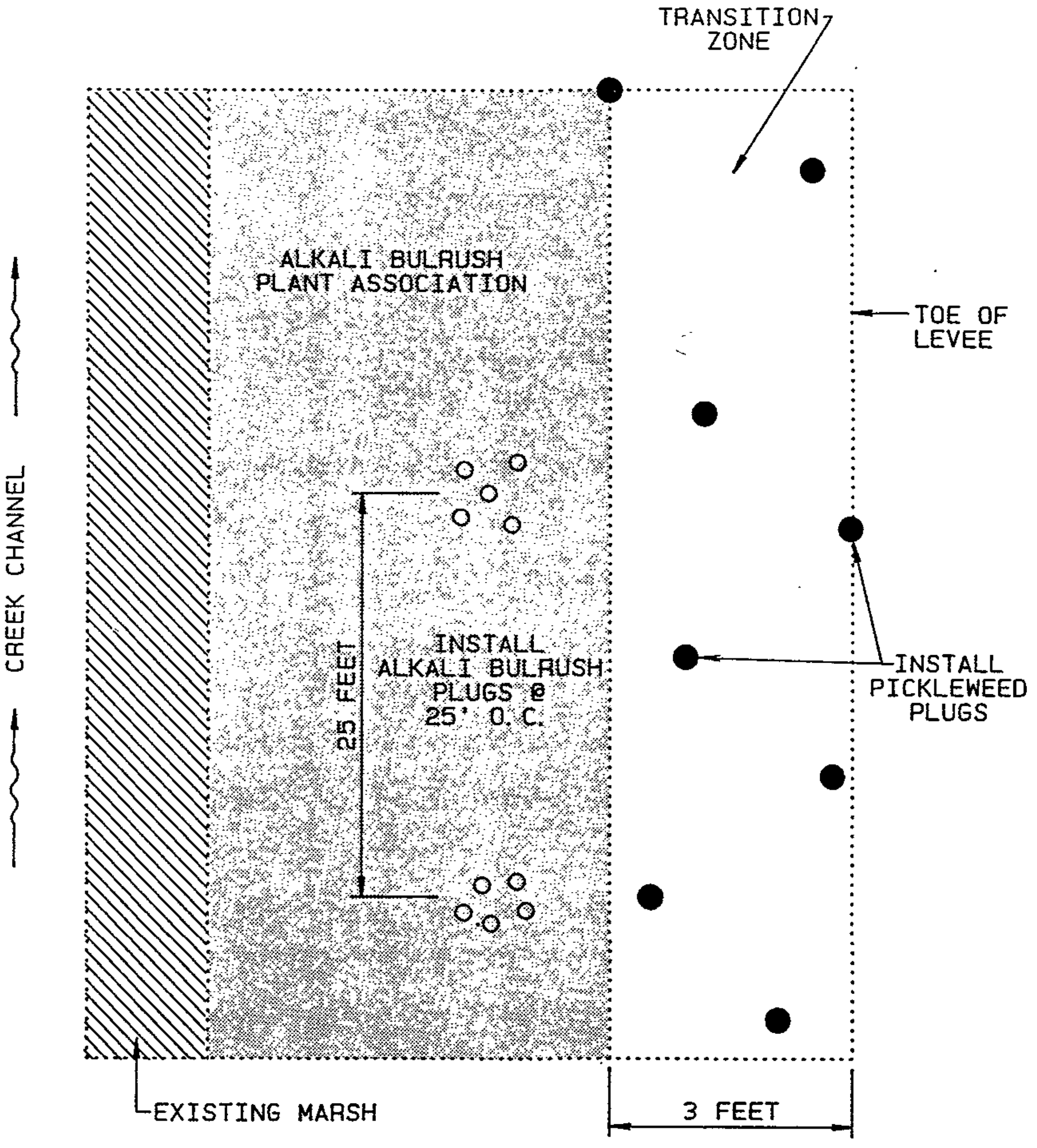
Santa Clara Valley Water District

ENGINEERING CERTIFICATION
PROJECT ENGINEER

ENGINEERING APPROVAL
DIVISION ENGINEER

CALABAZAS CREEK
REACH 9 & SAN TOMAS AQUINO CREEK
FIGURE 5E

SCALE AS SHOWN
SHEET 15R



LEGEND

● SALICORNIA VIRGINICA (PICKLEWEED)

○ SCIRPUS ROBUSTUS (ALKALI BULRUSH)

SANTA CLARA VALLEY WATER DISTRICT
TYPICAL PLANTING CONFIGURATION
FIGURE 6
DECEMBER 22, 1993

APPENDIX 2
PLANT SPECIES LIST

This appendix contains species lists for the project impact site and for the two reference areas.

IMPACT SITE (REACHES 9-11) SPECIES LIST

Scientific Name	Common Name
Artemisia douglasiana	California mugwort
Arundo dunax	giant reed
Atriplex patula var. hastata	fat hen
Avena barbata	wild oats
Baccharis pilularis ssp. consanguinea	coyote bush
Chrysopsis oregona	Oregon golden aster
Carduus pycnocephalus	Italian thistle
Cotula coronopifolia	brassbuttons
Distichlis spicata	salt grass
Elymus triticoides	creeping wild rye
Foeniculum vulgare	common fennel
Lepidium latifolium	broadleaf peppergrass
Lolium sp.	ryegrass
Malva sp.	mallow
Medicago polymorpha	burr clover
Picris echioides	bristly ox tongue
Plantago major	plantain
Polygonum sp.	smartweed
Polypogon monspeliensis	rabbitsfoot grass
Ricinus communis	castor bean
Rumex crispus	curly dock
Raphanus sativus	wild radish
Salix sp.	willow
Scirpus californicus	California bulrush
Scirpus robustus	alkali bulrush
Solanum sp.	nightshade
Typha domingensis	Dominican cattail
Typha angustifolia	narrowleaved cattail

B:\9PLNTLST

APPENDIX 2
PLANT SPECIES LIST

ALKALI BULRUSH ASSOCIATION REFERENCE SITE SPECIES LIST

Scientific Name	Common Name
Lepidium latifolium	broad leaf peppergrass
Scirpus californicus	California bulrush
Scirpus robustus	alkali bulrush
Typha angustifolia	narrow-leaved cattail

MARSH TRANSITION ASSOCIATION REFERENCE SITE SPECIES LIST

Scientific Name	Common Name
Atriplex patula var. hastata	fat hen
Chrysopsis oregona	Oregon golden aster
Cotula coronopifloia	brass buttons
Distichlis spicata	salt grass
Frankenia grandifolia	alkali heath
Grindelia humilis	marsh grindelia
Jaumea carnosa	fleshy jaumea
Lepidium latifolium	broad leaf peppergrass
Medicago sp.	burr clover
Oenanthe sarmentosa	water parsley
Salicornia virginica	pickleweed
Scirpus californicus	California bulrush
Scirpus rubustus	alkali bulrush
Typha angustifolia	narrow-leaved cattail

APPENDIX 3
VERTEBRATE WILDLIFE SPECIES LIST

This appendix contains a list of vertebrate wildlife species which are expected to occur at the Impact Area and Reference Area of Reach 9, Calabazas Creek, Santa Clara County, California.

SPECIES

CLASS: AMPHIBIA (Amphibians)

ORDER: SALIENTIA (Frogs and Toads)
  FAMILY: BUFONIDAE (True Toads)
  Western Toad (*Bufo boreas*)
  FAMILY: HYLIDAE (Treefrogs and Relatives)
  Pacific Treefrog (*Pseudacris regilla*)
  FAMILY: RANIDAE (True Frogs)
  California Red-legged Frog (*Rana aurora draytoni*)
  Bullfrog (*Rana catesbeiana*)

CLASS: REPTILIA (Reptiles)

ORDER: TESTUDINES (Turtles)
  FAMILY: EMYDIDAE (Pond and Marsh Turtles)
  Western Pond Turtle (*Clemmys marmorata*)

ORDER: SQUAMATA (Lizards and Snakes)
SUBORDER: SAURIA (Lizards)
  FAMILY: IGUANIDAE (Iguanids)
  Western Fence Lizard (*Sceloporus occidentalis*)
  FAMILY: SCINCIDAE (Skinks)
  Western Skink (*Eumeces skiltonianus*)
  FAMILY: ANGUIDAE (Alligator Lizards and Relatives)
  Southern Alligator Lizard (*Elgaria multicarinata*)

SUBORDER: SERPENTES (Snakes)
  FAMILY: COLUBRIDAE (Colubrids)
  Gopher Snake (*Pituophis melanoleucus*)

APPENDIX 3
VERTEBRATE WILDLIFE SPECIES LIST

SPECIES

CLASS: AVES (Birds)

ORDER: PODICIPEDIFORMES (Grebes)

FAMILY: PODICIPEDIDAE (Grebes)

Pied-billed Grebe (*Podilymbus podiceps*)

FAMILY: PHALACROCORACIDAE (Cormorants)

Double-crested Cormorant (*Phalacrocorax auritus*)

ORDER: CICONIIFORMES (Herons, Storks, Ibises, and Relatives)

FAMILY: ARDEIDAE (Herons and Bitterns)

American Bittern (*Botaurus lentiginosus*)
Great Blue Heron (*Ardea herodias*)
Great Egret (*Casmerodius albus*)
Snowy Egret (*Egretta thula*)
Green-backed Heron (*Butorides striatus*)
Black-crowned Night Heron (*Nycticorax nycticorax*)

ORDER: ANSERIFORMES (Screamers, Ducks, and Relatives)

FAMILY: ANATIDAE (Swans, Geese, and Ducks)

Canada Goose (*Branta canadensis*)
Wood Duck (*Aix sponsa*)
Green-winged Teal (*Anas crecca*)
Mallard (*Anas platyrhynchos*)
Northern Pintail (*Anas acuta*)
Cinnamon Teal (*Anas cyanoptera*)
Northern Shoveler (*Anas clypeata*)
Gadwall (*Anas strepera*)
American Wigeon (*Anas americana*)
Ruddy Duck (*Oxyura jamaicensis*)

ORDER: FALCONIFORMES (Vultures, Hawks, and Falcons)

FAMILY: CATHARTIDAE (New World Vultures)

Turkey Vulture (*Cathartes aura*)

FAMILY: ACCIPITRIDAE (Hawks, Old World Vultures, and Harriers)

Black-shouldered Kite (*Elanus caeruleus*)
Northern Harrier (*Circus cyaneus*)
Sharp-shinned Hawk (*Accipiter striatus*)
Cooper's Hawk (*Accipiter cooperii*)
Red-tailed Hawk (*Buteo jamaicensis*)

APPENDIX 3
VERTEBRATE WILDLIFE SPECIES LIST

SPECIES

FAMILY: FALCONIDAE (Caracaras and Falcons)
American Kestrel (*Falco sparverius*)
Merlin (*Falco columbarius*)
Peregrine Falcon (*Falco peregrinus*)

ORDER: GALLIFORMES (Megapodes, Currassows, Pheasants, and Relatives)
FAMILY: PHASIANIDAE (Quails, Pheasants, and Relatives)
Ring-necked Pheasant (*Phasianus colchicus*)

ORDER: GRUIFORMES (Cranes, Rails, and Relatives)
FAMILY: RALLIDAE (Rails, Gallinules, and Coots)
California Clapper Rail (*Rallus longirostris obsoletus*)
Virginia Rail (*Rallus limicola*)
Sora (*Porzana carolina*)
Common Moorhen (*Gallinula chloropus*)
American Coot (*Fulica americana*)

ORDER: CHARADRIIFORMES (Shorebirds, Gulls, and Relatives)
FAMILY: LARIDAE (Gulls and Terns)
Bonaparte's Gull (*Larus philadelphia*)
Ring-billed Gull (*Larus delawarensis*)
California Gull (*Larus californicus*)
Herring Gull (*Larus argentatus*)
Thayer's Gull (*Larus thayeri*)
Western Gull (*Larus occidentalis*)
Glaucous-winged Gull (*Larus glaucescens*)
Caspian Tern (*Sterna caspia*)
Forster's Tern (*Sterna forsteri*)

ORDER: STRIGIFORMES (Owls)
FAMILY: TYTONIDAE (Barn Owls)
Common Barn Owl (*Tyto alba*)
FAMILY: STRIGIDAE (Typical Owls)
Burrowing Owl (*Athene cunicularia*)

ORDER: CORACIIFORMES (Kingfishers and Relatives)
FAMILY: ALCEDINIDAE (Kingfishers)
Belted Kingfisher (*Ceryle alcyon*)

APPENDIX 3
VERTEBRATE WILDLIFE SPECIES LIST

SPECIES

ORDER: PASSERIFORMES (Perching Birds)

FAMILY: TYRANNIDAE (Tyrant Flycatchers)

Black Phoebe (*Sayornis nigricans*)
Say's Phoebe (*Sayornis saya*)

FAMILY: HIRUNDINIDAE (Swallows)

Tree Swallow (*Tachycineta bicolor*)
Violet-green Swallow (*Tachycineta thalassina*)
Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)
Cliff Swallow (*Hirundo pyrrhonota*)
Barn Swallow (*Hirundo rustica*)

FAMILY: CORVIDAE (Jays, Magpies, and Crows)

American Crow (*Corvus brachyrhynchos*)
Common Raven (*Corvus corax*)

FAMILY: AEGITHALIDAE (Bushtits)

Bushtit (*Psaltriparus minimus*)

FAMILY: TROGLODYTIDAE (Wrens)

Marsh Wren (*Cistothorus palustris*)

FAMILY: MUSCICAPIDAE (Old World Warblers, Gnatcatchers, Kinglets, Thrushes, Bluebirds, and Wrentit)

Ruby-crowned Kinglet (*Regulus calendula*)

FAMILY: LANIIDAE (Shrikes)

Loggerhead Shrike (*Lanius ludovicianus*)

FAMILY: STURNIDAE (Starlings)

European Starling (*Sturnus vulgaris*)

FAMILY: EMBERIZIDAE (Wood Warblers, Sparrows, Blackbirds, and Relatives)

Orange-crowned Warbler (*Vermivora celata*)
Yellow-rumped Warbler (*Dendroica coronata*)
MacGillivray's Warbler (*Oporornis tolmiei*)
Common Yellowthroat (*Geothlypis trichas*)
Wilson's Warbler (*Wilsonia pusilla*)
Savannah Sparrow (*Passerculus sandwichensis*)
Song Sparrow (*Melospiza melodia*)
Lincoln's Sparrow (*Melospiza lincolnii*)
Golden-crowned Sparrow (*Zonotrichia atricapilla*)
White-crowned Sparrow (*Zonotrichia leucophrys*)
Red-winged Blackbird (*Agelaius phoeniceus*)
Brewer's Blackbird (*Euphagus cyanocephalus*)
Brown-headed Cowbird (*Molothrus ater*)

APPENDIX 3
VERTEBRATE WILDLIFE SPECIES LIST

SPECIES

CLASS: MAMMALIA (Mammals)

ORDER: MARSUPIALIA (Opossums, Kangaroos, and Relatives)
FAMILY: DIDELPHIDAE (Opossums)
Virginia Opossum (*Didelphis virginiana*)

ORDER: INSECTIVORA (Shrews and Moles)
FAMILY: SORICIDAE (Shrews)
Ornate Shrew (*Sorex ornatus*)

ORDER: CHIROPTERA (Bats)
FAMILY: VESPERTILIONIDAE (Vespertilionid Bats)
Yuma Myotis (*Myotis yumanensis*)
California Myotis (*Myotis californicus*)
Big Brown Bat (*Eptesicus fuscus*)
Red Bat (*Lasiurus borealis*)
Hoary Bat (*Lasiurus cinereus*)

ORDER: LAGOMORPHA (Rabbits, Hares, and Pikas)
FAMILY: LEPORIDAE (Rabbits and Hares)
Brush Rabbit (*Sylvilagus bachmani*)
Desert Cottontail (*Sylvilagus audubonii*)
Black-tailed Hare (*Lepus californicus*)

ORDER: RODENTIA (Squirrels, Rats, Mice, and Relatives)
FAMILY: HETEROMYIDAE (Pocket Mice and Kangaroo Rats)
California Pocket Mouse (*Perognathus californicus*)
FAMILY: CRICETIDAE (Deer Mice, Voles, and Relatives)
Deer Mouse (*Peromyscus maniculatus*)
California Vole (*Microtus californicus*)
FAMILY: MURIDAE (Old World Rats and Mice)
Black Rat (*Rattus rattus*)
Norway Rat (*Rattus norvegicus*)
House Mouse (*Mus musculus*)

APPENDIX 3
VERTEBRATE WILDLIFE SPECIES LIST

SPECIES

ORDER: CARNIVORA (Carnivores)

FAMILY: CANIDAE (Foxes, Wolves, and Relatives)

Red Fox (*Vulpes vulpes*)

FAMILY: PROCYONIDAE (Raccoons and Relatives)

Raccoon (*Procyon lotor*)

FAMILY: MUSTELIDAE (Weasels, Badgers, and Relatives)

Long-tailed Weasel (*Mustela frenata*)

APPENDIX 4

LIST OF INVERTEBRATE FAMILIES OF CALABAZAS CREEK, REACH 9, REFERENCE AREA.

Samples were taken in alkali bulrush and in the transitional zone.
Vegetation samples were obtained using sweep nets.
Soil samples were obtained using benthic cores 10 cm. diameter x 10 cm. height.

ALKALI BULRUSH	TRANSITIONAL ZONE ASSOCIATION
VEGETATION SAMPLE	VEGETATION SAMPLE
CLASS INSECTA	CLASS INSECTA
Psocoptera (barklice)	Collembola (springtails)
Family unknown	Family Sminthuridae
* Homoptera (cicadas, hoppers, and aphids)	Homoptera (cicadas, hoppers, and aphids)
Family Aphididae (aphids)	Family Fulgoridae (planthopper)
	Family Aphididae (aphids)
* Coleoptera (beetles)	
Family Curculionidae (weevils)	Hemiptera (true bugs)
	Family unknown
* Diptera (flies, gnats, and midges)	
Family Mycetophylidae (gnats)	Diptera (flies, gnats, and midges)
Family unknown	Family unknown
	* Hymenoptera (ants, wasps, and bees)
	Family Formicidae (ants)
	Family Chalcidae (wasps)
* CLASS ARACHNIDA	CLASS ARACHNIDA (spiders, mites, and scorpions)
(spiders, mites, and scorpions)	
Araneae (spiders)	Araneae (spiders)
Family Tetragnathidae (Orb-weavers)	Family Tetragnathidae (Orb-weavers)
Families unknown	
BENTHIC SAMPLE	BENTHIC SAMPLE
CLASS INSECTA	CLASS INSECTA
Collembola (springtails)	Collembola (springtails)
Family Poduridae	Family Entomobryidae
Family Sminthuridae	Family Poduridae
* Diptera (flies, gnats, and midges)	Hemiptera (true bugs)
Diptera larvae	Family Corixidae (water boatmen)
Family unknown	
	Coleoptera larvae (beetle larvae)
CLASS CRUSTACEA (crustaceans)	Diptera (flies, gnats, and midges)
	Family unknown
Amphipoda	
Family Talitridae (beachhopper)	
	CLASS ARACHNIDA (spiders, mites, and scorpions)
	Acarina (mites)

* Invertebrates which the Salt Marsh Yellowthroat has been observed to consume (Foster 1977).

APPENDIX 5

PROJECT IMPLEMENTATION SCHEDULE

BRACKISH MARSH HABITAT MITIGATION AREA

Calabazas Creek

ACTIVITY	< -- 9 4 -- >						< -- -- -- -- 9 5 -- -- -- -- >												< -- -- -- -- 9 6 -- -- -- -- >												< -- 9 7 -- > >							> 2001		
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J				
Construct Flood Control Channel (R9 & 11)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■																								
Initiate Mitigation Process													■																											
Site Preparation													■	■	■	■																								
Obtain As-built Mapping																	■	■																						
Contract with Mitigation Consultant																	■	■																						
Prepare Mitigation Construction Plans																			■	■	■	■																		
Advertise Mitigation Const. Project																							■																	
Award Mitigation Const. Project																								■																
Issue Notice to Proceed																									■															
Site Monitoring Prior to Planting																	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■									
Install Mitigation Plants																																■	■	■						
Mitigation Completion Notice to COE																																		■						
Monitoring																																		■	■	■	■	■	■	■

APPENDIX 6

SAMPLE DATA COLLECTION SHEETS

H.T. HARVEY and ASSOCIATES
906 Elizabeth Street Alviso CA tel: (408) 263-1814

LINE TRANSECT FIELD SAMPLING DATA SHEET

Site:

Date: / /

Data collected by:

Page of

TRANSECT		BEG	END	DIST	BEG	END	DIST	BEG	END	DIST	BEG	END	DIST	TOTAL
	species													
	species													
	species													
	species													
	species													
	species													
	species													
	species													
	species													
	species													
	species													
	species													

APPENDIX S-II

RIPARIAN HABITAT MITIGATION AND MONITORING PLANS FOR IMPACTS WITHIN CORPS JURISDICTION AND FOR IMPACTS OUTSIDE CORPS JURISDICTION

APPENDIX S-II

RIPARIAN HABITAT MITIGATION AND MONITORING PLAN FOR IMPACTS WITHIN CORPS JURISDICTION

SANTA CLARA VALLEY WATER DISTRICT

CALABAZAS CREEK

RIPARIAN HABITAT MITIGATION AND MONITORING PLAN

Project No. 2010

Prepared by:

H.T. Harvey and Associates
Ecological Consultants
906 Elizabeth Street
Alviso, Ca 95002

Prepared under the Direction of:

Dr. Bernard H. Goldner
Environmental Specialist

Cindy Roessler
Assistant Environmental Specialist

Randall Talley
Flood Control Planning
Division Engineer

Kay Whitlock
Flood Control Manager

Ronald Esau
General Manager

OCTOBER 1992

DISTRICT BOARD OF DIRECTORS

Joe Pandit	**District 1**	**James J. Lenihan**	**District 5**
Patrick T. Ferraro, Chairman	**District 2**	**Sig Sanchez**	**At Large**
Robert W. Gross	**District 3**	**Joe Judge**	**At Large**
Joe Donohue, Vice Chairman	**District 4**		

H.T. HARVEY & ASSOCIATES

ECOLOGICAL CONSULTANTS

CALABAZAS CREEK
RIPARIAN HABITAT MITIGATION
AND MONITORING PLAN

Public Notice No. 16833S92

Prepared for
Santa Clara Valley Water District and
The U. S. Army Corps of Engineers

Prepared by
H. T. Harvey and Associates
Ronald R. Duke M.A., Principal
Dan Stephens, Project Manager

Date of Preparation: October 6, 1992

Date of Submittal to Corps of Engineers: October 15,1992

Project No. 672-02

906 ELIZABETH STREET • P.O. BOX 1180 • ALVISO, CA 95002 • 408-263-1814

This document will be distributed to the following contact persons:

Calvin Fong
Chief, Regulatory Branch
San Francisco District
U. S. Army Corps of Engineers
211 Main Street
San Francisco, CA 94105

Dr. Bernard Goldner
Environmental Section, Project Development Branch
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

James Browning
U. S. Fish and Wildlife Service
2800 Cottage Way, Room E - 1803
Sacramento, CA 95825-1846

Michael Thabault
National Marine Fisheries
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404

Mike Monroe
U. S. Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Carl Wilcox
California Department of Fish and Game
P.O. Box 47
Yountville, CA 94599

TABLE OF CONTENTS

page

Project Summary 1

Project Description 2

Goal of Mitigation 9

Final Success Criteria 12

Proposed Mitigation Site 14

Implementation Plan 16

Maintenance During Monitoring Period 19

Monitoring Plan 20

Completion of Mitigation 27

Contingency Measures 28

References Cited 29

Tables

Table 1 - Special Status Animal Species 8
Table 2 - Monitoring Schedule 26

Appendices

Appendix 1 - Figures

  - Figure 1a-b Project Area Road Maps
  - Figure 2 USGS Quad Map - Project Area
  - Figure 3 Reach 11 Impact Area
  - Figure 4 Reference Site Location Map
  - Figure 5 Mitigation Site Preparation
  - Figure 6 Typical Planting Configuration

Appendix 2 - Plant Species
Appendix 3 - Wildlife Species
Appendix 4 - Project Schedule
Appendix 5 - Sample Data Collection Sheets

PROJECT SUMMARY

This mitigation and monitoring plan has been prepared to address impacts to riparian habitat and mitigation related to the construction of flood control measures in Reaches 3A and 11 of Calabazas Creek. Appendix 1 contains figures showing the project location and the proposed mitigation.

The flood control project will permanently remove 0.09 acres of instream hydrophytic vegetation in Reach 3A and 0.06 acres of willow riparian habitat in Reach 11. These impact areas are within the jurisdiction of the Corps of Engineers. This mitigation plan proposes to compensate for that 0.15 acre impact by creating 0.3 acres of new riparian habitat. The mitigation area will be created by excavating the eastern bank in Reach 3A to expose a new streambed area 15 feet wide and 825 feet long. This new streambed area will then be planted with native willows and cottonwood (according to the schedule in Appendix 4).

The progress of the revegetation will then be monitored for up to eleven years. Specific success criteria, as described in this plan, must be met for the mitigation effort to be considered to have adequately compensated for the 0.15 acre impact.

I. PROJECT DESCRIPTION

A. PROJECT LOCATION

The Santa Clara Valley Water District proposes to construct flood control measures along approximately seven miles of Calabazas Creek between Guadalupe Slough and Miller Avenue in the cities of Santa Clara, Sunnyvale, and Cupertino in Santa Clara County. This mitigation plan is specific with respect to the project's streambed impacts and mitigation related to the Calabazas Creek flood control project; in Reach 3A from Homestead Road to a point 1,300 feet upstream and in Reach 11 from Tasman Drive to Old Mountain View Road. Appendix 1 contains all of the plan figures, including Figure 1a which is a road map to the Reach 3A project area and Figure 1b which is a road map to the Reach 11 project area. Figure 2 is a USGS quad map of the mitigation and reference areas. Mitigation shall be installed along approximately 825 feet of the creek immediately upstream of Homestead Avenue.

B. OVERALL PROJECT SUMMARY

Project Goal

The goal of the Calabazas Creek Flood Control Project is to provide 100 year flood protection and to control sedimentation and erosion problems. The entire project will cover approximately seven miles of Calabazas Creek, from Miller Avenue downstream to the Guadalupe Slough.

Proposed Construction

The proposed flood control project will modify 15,000 feet of existing levees, construct 11,000 feet of floodwall and 9,000 feet of gabion-lined channel; modify, or replace, 13 bridges and culverts; and build 5,000 feet of depressed maintenance roads and 25 channel access ramps. In Reach 3A, the project will regrade the earthen channel, construct stepped gabion bank lining, and build two concrete access ramps. In Reach 11 the project will consist of raising earthen levees, constructing a flood wall, regrading the channel bottom, and installing maintenance roads, access ramps and bridge modifications. The estimated total cost of the project is $ 16.5 million (SCVWD 1992).

Overall Project Impacts

The flood control project will impact riparian habitats at various locations along the riparian corridor. Impacts to riparian habitat in Reaches 1-8 were examined by the project Habitat Evaluation Procedure (HEP) which compared pre and post project conditions. The HEP analysis found that these impacts will be more than adequately mitigated by the installation of approximately 4,500 riparian plants in gabions and at the top of bank, a reduced and refined schedule for maintenance of vegetation in the flood control channel, the inclusion of a bypass channel in Reach 1B to minimize impact to a natural section of the creek, and the planting of streambed vegetation in Reach 3A.

Only a portion of these riparian impacts are within the jurisdiction of the Corps of Engineers. This plan specifically addresses those jurisdictional impacts in Reaches 3A and 11 which will be mitigated by planting in Reach 3A. In Reaches 3A and 11, 0.09 acres of instream hydrophytic vegetation and 0.06 acres of willow riparian habitat will be removed within Corps jurisdiction. These impacts will be mitigated by direct planting of streambed vegetation in Reach 3A.

The project will also result in the loss of 1.7 acres of coastal brackish marsh along Reaches 9-11 (SCVWD 1992). The impacts to the coastal brackish marsh shall be mitigated by the restoration and creation of a similar habitat in Reach 9 and along San Tomas Aquino Creek which are addressed a mitigation plan separately submitted to the Corps.

C. RESPONSIBLE PARTIES

The responsible party for this project is the Santa Clara Valley Water District. The principal contact is:

Mr. Randall Talley, Supervising Engineer
Flood Control Planning Division
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686
telephone (408) 265-2600

This mitigation and monitoring plan was prepared by H.T. Harvey and Associates. Ronald Duke is the project principal and Dan Stephens is the project manager.

D. JURISDICTIONAL AREAS TO BE FILLED

In Reach 3A, approximately 0.09 acres of hydrophytic vegetation within the jurisdiction of the Corps will be impacted by project construction and replaced by gabion lined bank. No figure is provided to show the vegetation to be impacted as it is spread out in numerous small patches. In Reach 11 0.06 acres of willow riparian habitat will be replaced by a maintenance road. Figure 3 shows the impact area in Reach 11. The total impact to jurisdictional areas in both reaches is 0.15 acres.

For Reach 3A, the jurisdictional impact areas were determined to be those areas within the limits of ordinary high water (OHW) and adjacent wetlands. Ordinary High Water was calculated based on the mean annual peak flow, which has a recurrence interval of 2.33 years. In Reach 3A OHW is located 4.6 feet above the channel bottom. In Reach 11, jurisdictional impact areas were determined to be those areas within the limits of the high tide line and adjacent wetlands. The high-tide line is based on a standard high tide 7.2 feet above mean lower low water, which is 2.86 feet below NGVD (National Geodetic Vertical Datum) at the Golden Gate Bridge, adjusted to the project area elevation NGVD.

The high tide line was calculated using a regression equation developed by the SCVWD for the South Bay:

Tide near Alviso = 1.42 + 1.05 (tide at Golden Gate above NGVD)

Thus, for the Calabazas high-tide line:

$$1.42 + 1.05\ (7.20 - 2.86) = 5.97\ \text{NGVD}$$

Adjacent wetlands were identified by the Habitat Restoration Group in 1991 using the Federal Manual for Identifying and Delineating Wetlands which was active at that time (Habitat Restoration Group, 1991).

E. TYPES, FUNCTIONS, AND VALUES OF JURISDICTIONAL AREAS

1. Jurisdictional Area Habitat Type

The jurisdictional area to be disturbed by project construction in Reach 3A consists of a sparsely vegetated stream bed and bank. The streambed vegetation grows in widely scattered clumps along the 25-40 foot wide stream channel. The sparse distribution of the vegetation is probably the result of regular maintenance by the District. In Reach 11, the jurisdictional area is a narrow band of riparian trees and emergent wetland on the western levee, primarily vegetated with willows. This area has been periodically cleared of vegetation in the past for flood control purposes.

2. Jurisdictional Area Functions and Values

Water Quality

Calabazas Creek conducts flows from the natural watershed upstream as well as District ground water recharge discharges. Recharge water is released into the stream during periods of the year when natural flows diminish. This groundwater recharge program improves the conditions for riparian vegetation in Reach 3A. Although surface flows are uncommon in summer, the streambed remains moist throughout most of the year. The water quality of the stream flows is acceptable judging from the general health of the areas riparian vegetation, in spite of some non-point source pollution from residential and street drainage. A defunct industrial site adjacent to Reach 3A may have contaminated groundwater in the area; however, if present, the contamination is at a depth too great to influence riparian vegetation. Reach 11 is just at the upper limit of tidal influence from San Francisco Bay.

Vegetation

The streambed in Reach 3A is composed of coarse, mixed-alluvium underlain by clay loam soils and is mostly barren. The habitat to be impacted during project construction comprises sparse hydrophytic vegetation in the streambed. The vegetation that will be impacted includes widely scattered clumps of small red willow, arroyo willow, Himalaya berry, fennel, smart weed, horse tail, nut grass, curly dock, and annual grass species. Appendix 2 contains a list of the scientific names of the latter species. Total impacts are estimated at less than 200 square feet.

Reach 11 has hydric soils which are clays and silty clays. The streambank vegetation which will be removed comprises yellow willow, sandbar willow and arroyo willow.

No special status plant species will be lost as a result of this portion of the Calabazas Creek Flood Control Project.

Wildlife

Appendix 3 contains a list of wildlife species expected to occur in the project impact area. Examples of resident avian species associated with the impact area's habitat include Green-backed Heron, Mallard, Turkey Vulture, Black-shouldered Kite, Cooper's, Red-shouldered, and Red-tailed Hawks, American Kestrel, California Quail, Killdeer, Western Screech-Owl, Anna's Hummingbirds, Belted Kingfisher, Nuttall's Woodpecker, Black Phoebe, Scrub Jay, American Crow, Chestnut-backed Chickadee, Bushtit, Bewick's Wren, American Robin, Mockingbird, Loggerhead Shrike, European Starling, California Towhee, Song Sparrow, Brewer's Blackbird and American Goldfinch.

Migrant birds that would occur in the impact area in summer (breeders) include Allen's Hummingbird, Pacific-slope Flycatcher, Ash-throated Flycatcher, Tree and Violet-green Swallows, House Wren, and Warbling Vireo. Other migratory species include Rufous Hummingbird, Willow and Hammond's Flycatchers, approximately six species of wood warblers (subfamily parulinae), and Western Tanager. Examples of wintering species are Sharp-shinned Hawk, Red-breasted Sapsucker, Common Flicker, Ruby-crowned Kinglet, Hermit Thrush, Cedar Waxwing, Yellow-rumped Warbler, White-crowned and Golden-crowned Sparrows, Dark-eyed Junco and Purple Finch.

Urban riparian habitats, such as Reaches 3A and 11, support relatively few amphibian and reptile species. The most commonly occurring herpetiles include California newt, arboreal salamander, western toad, Pacific treefrog, bullfrog, western fence lizard, southern alligator lizard, gopher snake, and common garter snake.

Adult California red-legged frogs (federal candidate 1 species, California species of special concern) and south western pond turtles (federal candidate 2 species and California species of special concern) could occur in permanent sources of water within Reaches 3A and 12. This is highly unlikely, but possible if they were washed downstream from the upper reaches of Calabazas Creek (Jennings pers. comm.).

Mammals that are predicted to occur in Reaches 3A and 11 include the Virginia opossum, broad-footed mole, black-tailed hare, California ground squirrel, Western gray squirrel, Botta's pocket gopher, house mouse, deer mouse, and Norway rat. Striped skunks, and raccoons are also expected to hunt or forage in this reach. Commonly occurring bats include the Yuma myotis, California myotis, Hoary bat, and little brown myotis.

Table 1 contains a listing of special status animal species and describes their potential for occurrence in Reaches 3A and 11. The only probable resident is the Black-shouldered Kite which is a fully protected species in the state of California.

In May and August of 1987 the aquatic habitat and fisheries of Calabazas Creek from Lawrence Expressway upstream to Comer Drive were surveyed. With the exception of goldfish, which were apparently released from Eden Road (well upstream of the mitigation and reference sites), no fish have been collected or observed (Smith 1989). It is likely that California roach (*Lavinia symmetricus*) and possibly threespine stickleback (*Gasterosteus aculeatus*) were native to this portion of the creek (Smith 1989) prior to the commencement of surface/ground water pumping and periodic droughts. Due to lack of appropriate habitat, Reach 3A of Calabazas Creek is considered to be unsuitable for steelhead. Even if this reach did contain habitat appropriate for steelhead, the fish would have to overcome 5 significant barriers from Lawrence Expressway to Comer Drive. One of the barriers is located downstream of the mitigation site.

Among the species which could occur in Reach 11 are staghorn sculpin (*Leptocottus armatus*), yellowfin goby (*Acanthogobius flavimanus*), northern anchovy (*Engraulis mordax*), starry flounder (*Platichthys stellatus*), Sacramento blackfish (*Orthodon microlepidotus*), hitch (*Lavinia exilicauda*), shiner perch (*Cymatogaster aggregata*), threadfin shad (*Dorosoma petenense*), striped bass (*Morone saxatilis*), longfin smelt (*Spirinchus thaleichthys*), threespined stickleback (*Gasterosteus aculeatus*), Pacific herring (*Clupea harengus pallasi*), Sacramento sucker (*Catostomus occidentalis*), prickly sculpin (*Cottus asper*), goldfish (*Carassius auratus*), and carp (*Cyprinus carpio*).

Recreational Use

Recreational use of Reach 3A is very limited due to lack of easy public access. It is likely that the stream is occasionally used by adventurous children and adults who explore the creek by walking on top of the banks or in the streambed. In Reach 11 occasional mid-day joggers and walkers may use the levee tops.

Table 1. State or federal special status animal species; their status, and potential occurence at Calabazas Creek, Reaches 3A and 11, Santa Clara County, California.

SPECIES		STATUS	POTENTIAL FOR OCCURRENCE ON SITE
Common Name	**Scientific Name**		
State or Federally Endangered or Threatened			
Willow Flycatcher	*Empidonax traillii*	CE	Probable transient.
California Species of Special Concern, State Protected, or Federal Candidate Species			
California Tiger Salamander	*Ambystoma tigrinum californiense*	FC2, S	Unlikely; no breeding habitat.
California Red-legged Frog	*Rana aurora draytoni*	FC1, S	Unlikely; no breeding habitat.
Black-shouldered Kite	*Elanus caeruleus*	CP	Probable resident.
Sharp-shinned Hawk	*Accipiter striatus*	S	Migrant and winter visitor.
Cooper's Hawk	*Accipiter coorperii*	S	Migrant and winter visitor.
California Yellow Warbler	*Dendroica petechia*	S	Transient, possible breeder.
Yellow-breasted Chat	*Icteria virens*	S	Transient, possible breeder.
Townsend's Big-eared Bat	*Plecotus townsendii*	FC2	Unsuitable habitat, presumed absent.
Pallid Bat	*Antrozous pallidus*	C	Unsuitable habitat, presumed absent.

CE = Designated as an endangered species by the California Fish and Game Commission.

FC1 = Designated as a candidate species by the federal government. Occurrence on list 1 indicates that U. S. Fish and Wildlife Service has sufficient biological information to support a proposal to list the species as Endangered or Threatened.

FC2 = Designated as a candidate species by the federal government. Occurrence on list 2 indicates that U. S. Fish and Wildlife Service has potential information for upgrading listing to endangered or threatened, but conculsive data on the biological vulnerability and threat are not currently available to support proposed listing.

S = Species of special concern, including species whose breeding populations in the state have declined severely or are otherwise so low that extirpatio possibility. There are no special legal statutes governing the protection of this group.

CP = Fully protected species in the state of California.

C = Taxa considered endangered or rare under section 153 80(d) of CEQA guidelines.

II. GOAL OF THE MITIGATION

A. TYPE OF HABITAT TO BE CREATED

The District proposes to provide in-kind mitigation for impacts to areas within Corps jurisdiction. The mitigation goal is to create high-quality streambed riparian habitat dominated by willow and cottonwood. The ultimate goal is to establish streambed riparian habitat with ecological functions and values equal to, or greater than, those of the riparian reference site. A riparian reference site was surveyed to gather data for modeling the mitigation site. This reference site is located approximately 3/4 of a mile downstream from the mitigation site (Figure 4) and comprises relatively high quality riparian forest similar to the habitat to be established at the mitigation area.

B. FUNCTIONS AND VALUES OF HABITAT TO BE CREATED

Water Quality

The information on water quality of the impact area (section I.E.2) is applicable to the mitigation and reference areas.

Vegetation

The riparian reference site is a 400 foot stretch of streambed riparian habitat dominated by willow species. The streambed is 15-30 feet wide. The site's soil is composed of a 1-2 feet layer of alluvium underlain by clay loam soils, similar to the mitigation site.

Percent cover by vegetation at the reference site was determined by randomly placing 8 transect groups. Each transect group was composed of three 15 foot transects parallel to the channel, each of which was bisected at a right angle by another 15 foot transect. The transects were placed along both the center and sides of the streambed. In areas where a clear separation of canopy layers existed, the percent cover data was broken up into overstory and understory cover. Transects located in areas supporting no overstory vegetation were discarded. Figure 4 shows the locations of the transects.

Overstory cover at the reference site was 55 % and understory cover was 13 %. All of the dominant species observed were native, with the exception of Himalaya berry. The cover values of the individual overstory species were as follows:

red willow	22 %
arroyo willow	15 %
Fremont cottonwood	5 %
coast live oak	12 %

Understory cover by species was as follows:

red willow	6 %
Himalaya berry	4 %
poison oak	3 %
Fremont cottonwood	0.3%

Plant heights of the three species to be installed at the mitigation site were measured with the aid of a clinometer. The following are the mean plant heights for each of the species:

Arroyo willow	18 feet
Red willow	22 feet
Fremont cottonwood	35 feet

Appendix 2 lists the woody plant species encountered at the riparian reference site.

Wildlife

Appendix 3 contains a list of wildlife species expected to occur at the mitigation site. Examples of resident avian species associated with the habitat to be created at the mitigation site include Green-backed Heron, Mallard, Turkey Vulture, Black-shouldered Kite, Cooper's, Red-shouldered, and Red-tailed Hawks, American Kestrel, California Quail, Killdeer, Western Screech-Owl, Anna's Hummingbirds, Belted Kingfisher, Nuttall's Woodpecker, Black Phoebe, Scrub Jay, American Crow, Chestnut-backed Chickadee, Bushtit, Bewick's Wren, American Robin, Mockingbird, Loggerhead Shrike, European Starling, California Towhee, Song Sparrow, Brewer's Blackbird and American Goldfinch.

Migrant birds that are expected to occur in the streambed areas of Reach 3A in summer (breeders) include Allen's Hummingbird, Pacific-slope Flycatcher, Ash-throated Flycatcher, Tree and Violet-green Swallows, House Wren, and Warbling Vireo. Other migratory species include Rufous Hummingbird, Willow and Hammond's Flycatchers, approximately six species of wood warblers (subfamily parulinae), and Western Tanager. Examples of wintering species are Sharp-shinned Hawk, Red-breasted Sapsucker, Common Flicker, Ruby-crowned Kinglet, Hermit Thrush, Cedar Waxwing, Yellow-rumped Warbler, White-crowned and Golden-crowned Sparrows, Dark-eyed Junco and Purple Finch.

The discussion of amphibians, reptiles, mammals, and fishery resources in Reach 3A contained in section I.E.2 of this plan applies equally well to the wildlife resources anticipated in the mitigation area.

Recreational Use

Recreation at the mitigation site is very limited due to lack of easy public access. It is likely that the stream is occasionally used by children and adults who may explore the creek by walking on top of the banks or in the streambed.

C. TIME LAPSE

It is estimated that it will take 7-11 years before the mitigation site develops habitat functions and values equal to or greater than that of the reference site.

III. FINAL SUCCESS CRITERIA

A. TARGET FUNCTIONS AND VALUES

Vegetation

The overstory cover value derived from the reference site was 55 %. The reference site is the best example of streambed riparian habitat within 2-3 or more miles of the mitigation site, nevertheless, the habitat has been disturbed. Therefore, we propose that the percent cover success criteria for the mitigation site be increased beyond that of the reference site. This takes into account the fact that the mitigation area is being fully planted with willow and cottonwood and that it will be free of maintenance activities. The total percent cover success criteria proposed is 65%. In addition, each species must attain at least 15% cover. No understory species are being installed, therefore, no understory percent cover success criteria has been developed.

The forest canopy of the revegetation site in the first 3-5 years will be composed of a relatively uniform overstory of willow and cottonwood. Himalaya berry and poison oak shrubs are expected to colonize the understory. In years 5-25 the cottonwood will surpass the willow in height to form an upper canopy, with the willow species forming an intermediate canopy. During this time period it is expected that a shrub layer of Himalaya berry, poison oak, and an occasional California wild rose will also develop. Through time, the form and composition of the revegetation site will be influenced by periodic floods which will open forest gaps and allow advantageous species to become established.

Wildlife

The basic success criteria for the riparian mitigation site is an abundance index, and species diversity, richness and composition similar to, or greater than, that of the reference site. This result should be achieved by year 11.

Since the mitigation area does not support a native fishery, success criteria and monitoring related to fisheries resources are not proposed.

B. TARGET HYDROLOGY REGIME

The mitigation site hydrology will change due to project construction. The hydraulic capacity of the channel will increase due to widening of the channel and a low flow channel will be excavated along the western side of the channel. The changes in hydrology will not significantly affect the site's suitability for instream riparian restoration. The two-year flood elevation will remain at 4.5-5.0 feet in depth and natural flows and recharge releases will continue to inundate the streambed with the same regularity as is currently observed. Therefore, the target hydrology regime is that site flows will continue unchanged.

C. TARGET JURISDICTIONAL ACREAGE TO BE CREATED

The excavation of the existing streambank in Reaches 3A and 11 will impact habitat along the streambank from the toe of the bank to the OHW level (4.6 feet depth of flow, measured from the channel bottom) and in adjacent wetlands which measures approximately 0.15 acres. The widening of the stream channel in Reach 3A will create 0.28 acres of new jurisdictional wetland. The net gain of wetland in Reach 3A is thus 0.13 acres. Figure 5 cross-sections show the position of the existing stream bank, the proposed gabion lined bank, and the OHW level (also shown in plan view).

IV. PROPOSED MITIGATION SITE

A. LOCATION AND SIZE OF THE MITIGATION AREA

The mitigation site is located along the eastern edge of Reach 3A of Calabazas Creek (Figures 1, 2 and 5). The mitigation site is 15 feet wide and 825 feet long, for a total of approximately 0.3 acres. The mitigation area was chosen because of its location immediately adjacent to a parcel of land available for acquisition, the ease with which it could be integrated into the flood control design, and the fact that it will not require maintenance clearing.

B. OWNERSHIP STATUS

The centerline of the creek is the property line. The east side is owned by Marcheese Farms and will be acquired in by the District as part of this project. The west side of the centerline is currently owned in fee title by the District.

C. EXISTING FUNCTIONS AND VALUES OF THE MITIGATION AREA

Vegetation

The mitigation area is presently a streambank that supports healthy stands of riparian vegetation. The trees and shrubs are relatively well developed and moderately dense. The woody plant species found along the streambank include: coast live oak, California black walnut, Mexican elderberry, buckeye, Himalaya berry and others.

Wildlife

This discussion of wildlife resources in section I.E.2 is equally applicable to the mitigation area. Project biologists will survey the mitigation area 2-4 weeks prior to project construction to determine if any special status animal species (see Table 1) are present. If any special status animals are present then the resource agencies will be contacted to determine what protective action would be appropriate.

D. PRESENT AND PROPOSED USES OF THE MITIGATION AREA

The mitigation site is bordered by an orchard on its eastern side, a parking lot on its western side, and Homestead Road on the northern end. The only proposed uses for the mitigation area are related to the District flood control project and ground water recharge program. Future maintenance of the area by the District will be restricted in the mitigation area to preclude the use of herbicides and the removal of vegetation. The only exception would occur if public safety becomes a concern due to an obstruction by debris of the creek which could flood adjacent properties in which case the debris would be removed, but vegetation would not be otherwise disturbed. The flood control design allows for the vegetation in the mitigation area to become very dense without compromising the flood control capacity of the creek.

E. JURISDICTIONAL DELINEATION

The excavation of the existing streambank will impact a jurisdictional area along the streambank from the toe of the bank to the OHW level (4.6 feet depth of flow, measured from the channel bottom) and adjacent wetlands which measures approximately 0.15 acres. This streambank area will be replaced by a gabion lined bank, maintenance road and access ramp and is thus considered a loss of jurisdictional wetland. If left intact this streambank would continue to develop as a riparian habitat although it would periodically be trimmed or cleared as a flood control maintenance activity. As discussed in section III.C there is, however, a net gain of 0.13 acres of jurisdictional area.

F. PRESENT AND PROPOSED USES OF ALL ADJACENT AREAS

The parcel to the east of the mitigation area is an orchard. It may be developed as a site for a hospital in the future. The parcel to the west is a inactive paved commercial lot, with no structures. It may be used for commercial purposes in the future.

G. ZONING

From the centerline of the creek east the site is zoned agricultural and to the west it is zoned commercial.

V. IMPLEMENTATION PLAN

A. RATIONALE FOR EXPECTING MITIGATION SUCCESS

Section III.B discusses site hydrology and concludes that the streambed is suitable for riparian restoration. Four soil pits were dug along the streambank and the soil was field tested and determined to be a clay loam. No soil characteristics were observed which would hinder plant growth. In addition, healthy riparian vegetation is currently growing along the streambank, indicating that the site's soil is suitable for restoration activities.

The Santa Clara Valley Water District has experience implementing several restoration projects in riparian zones. H. T. Harvey and Associates has designed many habitat restoration projects during the past 15 years, including over 20 projects during the past three years. The combined experience of the District and Harvey and Associates is assurance that the project is designed by qualified professionals and will be implemented and maintained by an agency with restoration experience.

B. RESPONSIBLE PARTIES

The responsible party for ensuring proper implementation of this plan is:

Dr. Bernard Goldner
Environmental Section, Project Development Branch
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

telephone (408) 927-0710

C. SITE PREPARATION

The mitigation area shall be created by excavating the eastern streambank and thereby widening the streambed by 15 feet. The stream channel reconstruction shall be carried out with the use of power shovels (large backhoes) and bulldozers. Gabion baskets will be installed on both sides of the creek. The foot of the eastern gabion baskets will define the eastern limit of the mitigation site. Prior to plant installation, 24" x 36" holes shall be augured for willow cuttings and 24" x 48" holes shall be augured for cottonwood pole cuts. Figure 5 shows the layout of the mitigation area, including cross-sections.

D. PLANTING PLAN

The mitigation site shall be densely planted with red willow, arroyo willow, and Fremont cottonwood. The typical planting layout is shown in Figure 6. Willow shall be planted on 8 foot centers. The cottonwood shall be planted along the toe of the streambank on 25 foot centers. Revegetation efforts are expected to be enhanced by natural recruitment of willow, cottonwood, and other riparian species. The numbers of plants to be installed are as follows:

red willow	97
arroyo willow	97
Fremont cottonwood	33

The willow cuttings and cottonwood poles shall be custom collected from riparian habitats within 5 miles of the mitigation site. The cuttings and poles shall be taken from healthy, vigorous, trees growing on sites similar to the mitigation site. The plant material shall be harvested from several different trees to vary the genetic diversity of the planting. There are numerous areas within 5 miles from which sufficient cuttings could be taken. The selection of actual harvest sites will be delayed until 6 months prior to planting. At that time the most healthy stands will be identified. Permission will be obtained from the California Department of Fish and Game prior to harvesting the cuttings.

Pole and cuttings shall be installed within 3 days of harvesting. If the plant propagules cannot be installed immediately they must be stored in barrels of water with the tips exposed to the air, in a cool shaded site.

The cottonwood poles shall be 5-6 feet long with a minimum basal diameter of 2 inches and a minimum tip diameter of 0.5 inches. The willow cuttings shall be 24 inches long with a minimum basal diameter of 0.5 inches. Both pole cuts and cuttings shall have their tips slant cut and their bases flat cut to assist in distinguishing which ends shall be placed in the soil.

Willow cutting and cottonwood pole cut harvesting and installation shall occur when the trees are dormant between November 15 and January 15. Willow cuttings shall be installed to a depth of 12 inches. Cottonwood pole cuts shall be installed to a depth of 24 inches. An "Osmocote" 21 gram 20-10-5 slow release fertilizer tablet or its equal shall be placed in the soil adjacent to the cuttings and pole cuts.

Following plant installation, each planting site will be covered with a 3' x 3' woven polypropylene (3.0 ounce) weed control mat buried 3 inches below the surface and lightly compacted. The weed control mats will also be held in place by eight inch, 11 gauge wire staples placed on each corner of the mat and along the cut.

The mitigation area will be signed to ensure that flood control maintenance crews do not inadvertently clear vegetation from the mitigation areas. Permanent signs will be prominently placed at the beginning, middle and end of the mitigation area.

E. SCHEDULE

The site is scheduled for preparation in the late summer-fall of 1996 and planting in the winter of 1996-97. A project schedule is included in Appendix 4.

F. IRRIGATION PLAN

The cuttings and pole cuts shall be given a single deep irrigation of a minimum of 10 gallons each immediately following installation. Some watering may be required the first summer following plant installation depending on how much rain falls during the year. Further irrigation will not be required unless drought conditions prevail since the cuttings will be installed in moist, streambed soils.

G. AS-BUILT CONDITIONS

A plan will be submitted to the Corps within 10 weeks of completion of site preparation and planting which describes the as-built status of the mitigation site. Reports for grading and planting shall be submitted separately, as current plans call for the planting and grading work to be completed more than 6 weeks apart. Any deviations from the final mitigation plans shall be clearly marked on the as-built plan set. The as-built plans shall show the actual post-grading spot elevations of the mitigation area and the areas in which all plants are installed. Individual plant locations will not be indicated, but the limits of each plant association shall be accurately identified. An aerial photograph may be taken following site planting and underlain with the as-built plans. The plans will also show the location and direction for photo-documentation monitoring.

VI. MAINTENANCE DURING MONITORING PERIOD

A. MAINTENANCE ACTIVITIES

Maintenance activities at the mitigation site will include periodic weeding and yearly plant replacement during a plant-establishment period of 3 years. Weeds shall be removed from the base of each plant installed, and from the weed fabric slit, in March, and June of each year. If yearly monitoring indicates that the performance criteria are not being met, dead plants shall be replaced with cuttings or pole cuts of the same species between November 15 and January 15 of each year. At the end of the three year plant-establishment period, assuming that all performance criteria have been met, active maintenance will cease. If continued monitoring indicates that the site is not meeting performance criteria, maintenance activities may be renewed as a contingency action.

B. RESPONSIBLE PARTIES

The responsible person for implementing maintenance activities is:

Dr. Bernard Goldner
Environmental Section
Project Development Branch
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

telephone (408) 927-0710

C. SCHEDULE

Maintenance activities and inspections shall occur in March and June for weeding and between October 15 and January 15 for plant replacement.

VII. MONITORING PLAN

A. PERFORMANCE CRITERIA

Vegetation

Combined survival of all the species installed shall not be less than 70% and survival of individual species not less that 60% during the first three years following plant installation. If more than 30% of the plants are replaced during the first three years then the monitoring period shall start anew. If combined and individual plant survival criteria are met at the end of the third year, survival will no longer be used as a success criterion and percent cover will be the key performance criteria. The rationale for not using survival as a success criteria beyond the third year is that it will not be an accurate indicator of habitat development after year 3.

The performance criteria for overstory percent cover for native riparian species at the mitigation site shall be as follows:

	All Species Combined	Individual Species
Year 1 -	5%	1
Year 2 -	15%	3
Year 3 -	25%	5
Year 4 -	30%	6
Year 5 -	35%	8
Year 6 -	40%	9
Year 7 -	45%	10
Year 8 -	50%	11
Year 9 -	55%	12
Year 10 -	60%	13
Year 11 -	65%	15

The performance criteria for plant height were derived from data collected at the reference site. The performance criteria for mean plant height at the mitigation site at the end of years 5 and 11 shall be the following for each of the species installed:

	Year 5	Year 11
Arroyo willow	10 feet	18 feet
Red willow	12 feet	22 feet
Fremont cottonwood	18 feet	35 feet

Mean plant height is the mathematic average of all plant heights measured, thus not every plant will need to reach the heights cited above. The plant height performance criteria is considered to be a good quantitative indicator of plant health and vigor and no additional criteria is proposed for those two plant characteristics. Reproductive success at the site will be evidenced by the gradual encroachment of new individual native willows and cottonwoods. The number of these "volunteers" will be tracked during monitoring but it would be difficult to pre-set a performance criteria for this site characteristic.

Wildlife.

Avian success criteria for the Reach 3A mitigation are not as easily quantifiable as revegetation goals. Avian species composition, species diversity, richness and relative abundance indices should approximate those derived from surveys of the reference site.

During the early stages of regeneration, the mitigation site will not be directly comparable to the reference site because the vegetation in the latter area is mature. Initially, the habitat will comprise primarily small willows with scattered cottonwood that will be approximately 3-5 feet tall at the end of year 1. This habitat will be ideal for species such as Mourning Doves, Lesser Goldfinch, wintering *Zonotrichia* sparrows and migrants such as Wilson's and MacGillivray's Warblers. In addition, reptiles such as the western fence lizard, southern alligator lizard, and the gopher snake will forage in the early successional stages. Mammals such as the black-tailed hare, desert cottontail, California ground squirrel, and Botta's pocket gopher will also utilize this habitat.

As the revegetated riparian area develops, avian species composition and relative abundance should increase and approach values detected through monitoring at the reference site. As the habitat matures, it will become more productive for birds in general and more suitable, in particular for, species such as Sharp-shinned and Cooper's Hawks, Western

Screech-Owl, Anna's and Allen's Hummingbirds, Nuttall's Woodpecker, Pacific-slope Flycatcher, Scrub Jay, Bushtit, Bewick's Wren, Hermit Thrush, Northern Mockingbird, Warbling Vireo, and migrant parulid warblers. In addition, as thermal protection increases it will provide habitat for the California newt, Arboreal salamander, and Pacific treefrog. Finally, mammals such as the Virginia opossum, Western gray squirrel, and raccoon, will nest in the mature trees.

Since the mitigation area does not support a native fishery, implementation of mitigation will not effect the fishery resources of Calabazas Creek. Therefore, success criteria and monitoring related to fisheries resources are not proposed.

B. MONITORING METHODS

Vegetation

Monitoring Methods. Percent cover will be measured in the mitigation area using line-intercept sampling along fixed transects as was done at the reference site. Figure 5 shows the location of the mitigation area monitoring transects. Fifteen foot long transects will be laid out at seventeen locations (every 46 feet) in the mitigation area. One transect will traverse the width of the revegetation area and another will be randomly located across it at a right angle at each sampling location. Line-intercept cover measurements will be taken along all transects, with the data recorded by species.

The height of a minimum of 15% (15 individuals) of each of the willow species and 30% (10 individuals) of the cottonwood plantings shall be measured using a telescopic measuring pole and/or a clinometer. Individual trees that will be measured for height shall be randomly chosen at the time of the first data collection. Selected trees shall be tagged and mapped for future data collection.

Natural recruitment shall be tracked by noting the number of non-installed plants encountered during the line intercept transects. Plant survival in Years 1-3 shall be monitored by surveying 100% of the plants installed.

Photographs shall be taken during each monitoring period. They shall be taken from the same vantage point and in the same direction every year. The as-built plans will show the location and direction of each photo-documentation station.

Additional notes shall be taken to ensure that any significant problems which are not evident from the sampling results are identified. Notes of this nature will include items such as the cause(s) of mortality, the identification of significantly higher mortality in particular areas, the overall health and vigor of the vegetation, and invasion of non-native species into the mitigation site.

The proposed data collection monitoring sheets are presented in Appendix 5.

Data Analysis. The data collected shall be analyzed as follows:
1) Significant differences in mean plant height between years shall be tested for with an Analysis of Variance (ANOVA). A Tukey's test will be used to test for significant differences between individual years.
2) A "T" test shall be employed to test for significant difference in mean plant height during individual years at the mitigation site versus the mean plant height measured at the reference site in the spring of 1992.
3) Percent cover for the mitigation site as a whole, and for individual species, shall be reported using descriptive statistics including means, standard deviations, and variances.
4) Natural recruitment in a given year shall be compared to natural recruitment in previous years.
5) Plant survival shall be recorded by species.

Sampling will take place in August of each year and shall be conducted by a qualified biologist.

Wildlife

The avian monitoring survey protocol for the mitigation area and reference area should include surveys during the breeding and the wintering periods. Riparian areas provide important habitat for seasonally specific assemblages of birds (e.g., see Rosenberg et al., 1987). Each area should be surveyed a minimum of three dates per season. Censusing should take place between 15 May and 15 July (breeding season) and 15 December and 1 March (winter period).

The reference site comprises approximately 400 linear feet of riparian habitat along the creek. This length is too short for most standard census techniques with the exception of direct counts. Thus, the area should be censused using this method. During direct counts, all individual birds of all species detected in a defined area are recorded. In this situation, the area should include the riparian habitat on both sides of the channel and an area up to 50 meters on either side of the outer limit of the riparian strip.

The area should be walked slowly and thoroughly searched (audially and visually) for all birds. Censusing should occur during the period between thirty minutes before sunrise to four hours after sunrise (starting the census as early as possible within this period is recommended). All birds detected by sight or sound should be recorded and the general habitat of each bird detected should be noted. Abiotic variables such as wind speed and direction, cloud cover and ambient temperature should be noted at the beginning and end of each census. Surveys should not be conducted during heavy rain, heavy fog, or windy conditions (i.e., when wind-blown vegetation interferes with avian detection).

The census data will be used to calculate seasonal avian richness, diversity, density, and species composition.

C. ANNUAL REPORTS

Yearly monitoring results shall be presented in annual reports. They shall assess both the attainment of yearly target criteria and progress toward final success criteria. Each monitoring report shall include a list of names, titles, and companies of all persons who prepared the report and participated in the monitoring activities. The reports shall include a copy of the Corps permit and any special conditions, and subsequent letters of modifications as an appendix. The Corps permit number will be cited on the front page. Included in the reports shall be the analysis of all quantitative monitoring data. Monitoring photographs and maps identifying the monitoring areas, transects locations shall also be included as appropriate. Remedial action recommendations, if needed, will be proposed in the monitoring report.

Annual reports shall be submitted to the Corps by October 1 of each year.

Copies of all field data sheets shall be available for Corps review as needed.

D. SCHEDULE

A schedule for implementing each monitoring activity is included in Table 2.

TABLE 2

MONITORING SCHEDULE

REACH 3A MITIGATION SITE - CALABAZAS CREEK

MONITORING TASK	1995	Nov. 1996	Nov. 96- Feb. 97	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Monitoring During Grading	X													
As-built Grading Plans		X												
As-built Planting Plans			X											
Plant Survival*				X	X	X	***							
Percent Cover*				X	X	X	X	X	X	X	X	X	X	X
Plant height*								X						X
Natural Recruitment*				X	X	X	X	X	X	X	X	X	X	X
Vertebrate Wildlife**							X	X		X		X		X
Photo-documentation			X	X	X	X	X	X	X	X	X	X	X	X

* Vegetation monitoring will be conducted in August of each year.

** Wildlife monitoring will be conducted several times each year, according to the protocol described in section VII.A of the mitigation and monitoring plan.

*** Plant survival monitoring will be discontinued after 1999 if the performance criteria is met. If the criteria is not met then survival monitoring will continue for another 3 years.

VIII. COMPLETION OF MITIGATION

A. NOTIFICATION OF COMPLETION

If during, or by the end of the 11 year monitoring period, the final success criteria have been met then the Santa Clara Valley Water District shall submit the monitoring report documenting project completion to the Corps for final approval.

B. CORPS CONFIRMATION

Following submittal of the report the Corps may require a site visit to confirm the completion of the mitigation effort.

IX. CONTINGENCY MEASURES

A. INITIATING PROCEDURES

If an annual performance criteria is not met, or if the final success criteria are not achieved, then the Santa Clara Valley Water District shall prepare an analysis of the cause (s) of failure. Remedial action alternatives shall be developed by the District and submitted to the Corps within 2 months following preparation of the monitoring report. After review by the Corps, the SCVWD will take remedial action as requested by the Corps to meet mitigation goals.

B. ALTERNATIVE LOCATIONS FOR CONTINGENCY MITIGATION

Alternative locations for contingency mitigation have not been identified at this time. Analysis of site conditions indicates that success of the mitigation is probable. If the site is determined to be unsuitable during monitoring then alternative mitigation sites will be identified as a proposed remedial action.

C. FUNDING MECHANISM

Funding of contingency measures will be from the same source as mitigation installation. The project relies on existing revenues, including property tax allocation and flood control benefit assessments, and debt financing by way of certificates of participation or other borrowing mechanisms.

D. RESPONSIBLE PARTIES

The responsible person for contingency measures is:

Dr. Bernard Goldner
Environmental Section
Project Development Branch
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

telephone (408) 927-0710

REFERENCES CITED

California Department of Fish and Game. 1990. Letter to the U.S. Army Corps. of Engineers dated 11/14/90 regarding Public Notice 16833S92.

Emlen, J. J. 1971. Population densities of birds derived from transect counts. Auk 88:323-342.

Emlen, J. J. 1977. Estimating breeding bird densities from harvest counts. Auk. 94: 445-468.

Jennings Mark, - Herpetologist, Cal Academy of Sciences, Golden Gate Park, San Francisco, CA 94132.

National Marine Fisheries Service. 1990. Letter to the U.S. Army Corps. of Engineers dated 8/21/90 regarding Public Notice 16833S92.

Poole, Robert W. 1974. An Introduction to Qualitative Ecology. McGraw-Hill Book Company. 532 pp.

Ralph, C. J., G. R. Geupel, P. Pyle, T. E. Martin, D. F. DeSante. 1992. Field methods for monitoring landbirds (draft). USDA Forest Service, Redwood Science, Laboratory, 1700 Bayview Drive, Arcata, Ca 95521.

Rosenburg, K. U., S. B. Terrill, and G.H. Rosenberg 1987. Value of suburban habitats to desert riparian birds. pp. 642-654. Wilson Bull.

Sanders, S. D.. 1987. Letter to SCVWD dated 6/17/87 regarding project HEP analysis.

Smith, Jerry J. 1989. Fisheries Values of Calabazas Creek Lawerence Expressway to Miller Avenue. The Habitat Restoration Group.

Santa Clara Valley Water District. 1992. Calabazas Creek planning study (Guadalupe Slough to Miller avenue) consisting of the combined engineer's report and final environmental impact report.

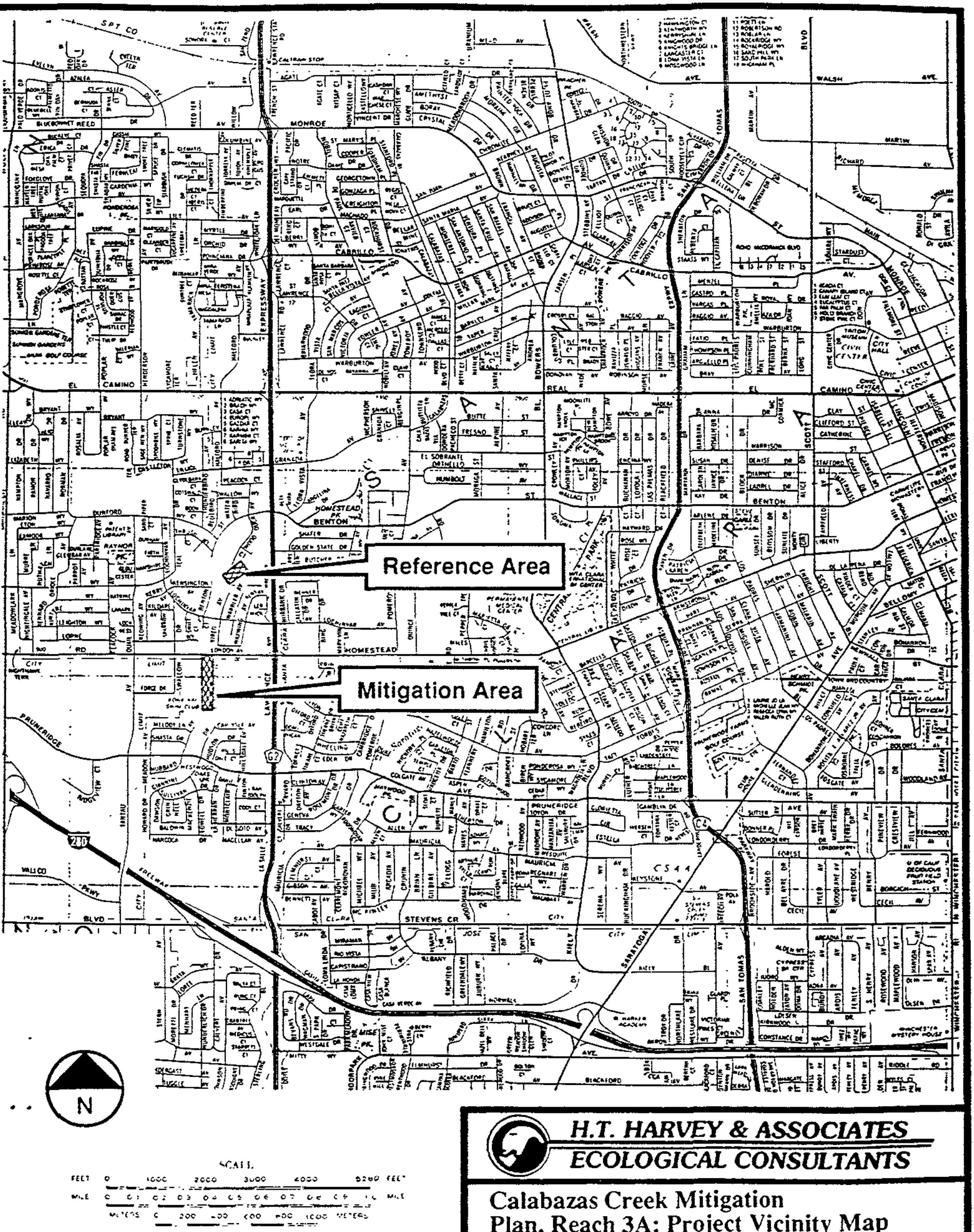
U. S. Army Corps of Engineers. 1990. Public Notice No. 16833S92.

U. S. Environmental Protection Agency. 1990. Letter to the U. S. Army Corps of Engineer's dated 8/28/90 regarding Public Notice 16833S92.

U. S. Fish and Wildlife Service 1990. Letter to the U. S. Army Corps of Engineers dated 8/27/90 regarding the Public Notice 16833S92.

APPENDIX 1

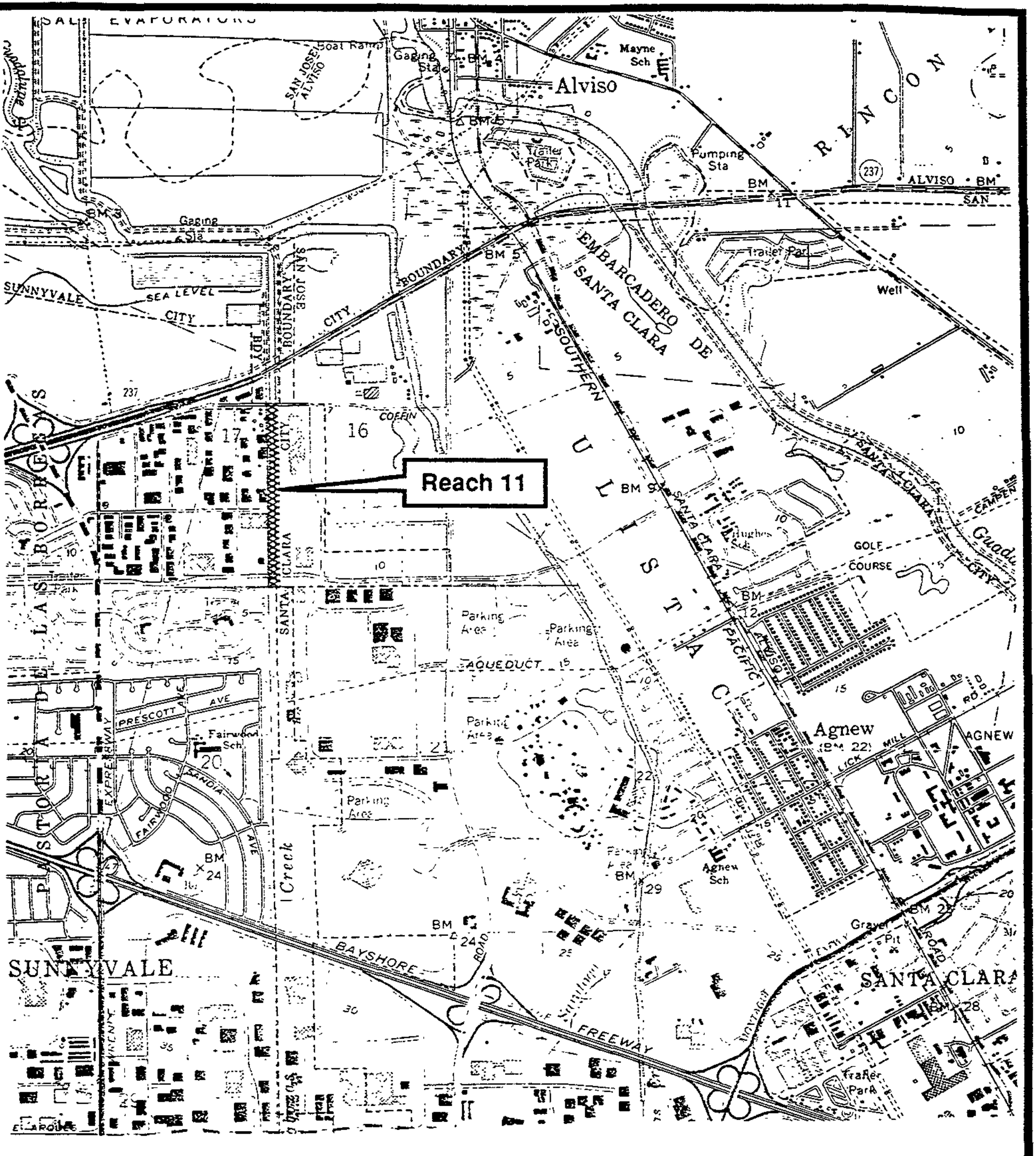
FIGURES



H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Calabazas Creek Mitigation Plan, Reach 3A: Project Vicinity Map

S-135 | File No. 672-02 | Date 5/9/92 | Figure 1A



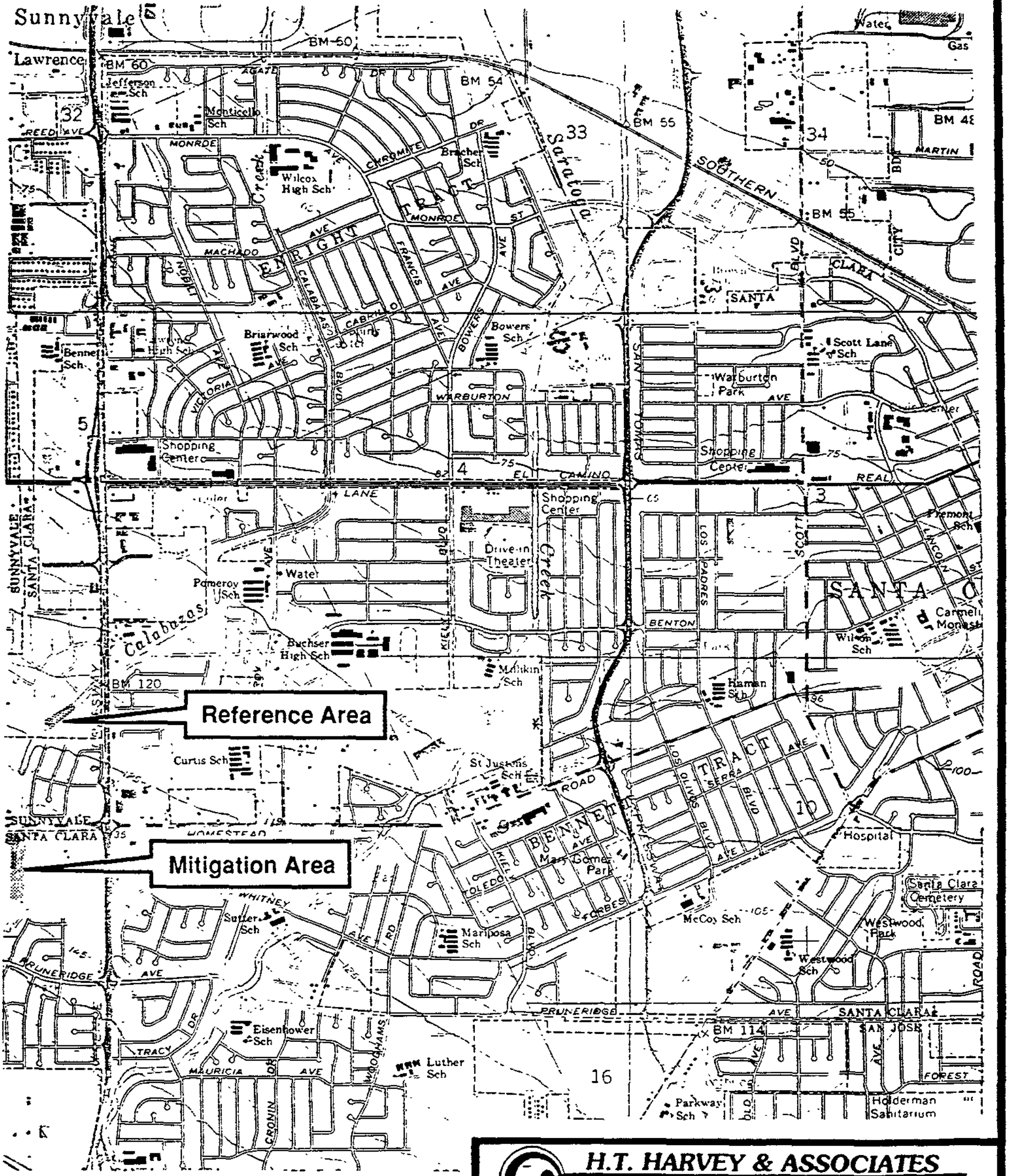
. Milpitas Quadrangle
(section) 7.5 Minute Series

S-137

H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Calabazas Creek Mitigation Plan, Reach 11: Project Vicinity Map

File No. 672-02	Date 5/9/92	Figure 1B



San Jose West Quadrangle
(section) 7.5 Minute Series

N

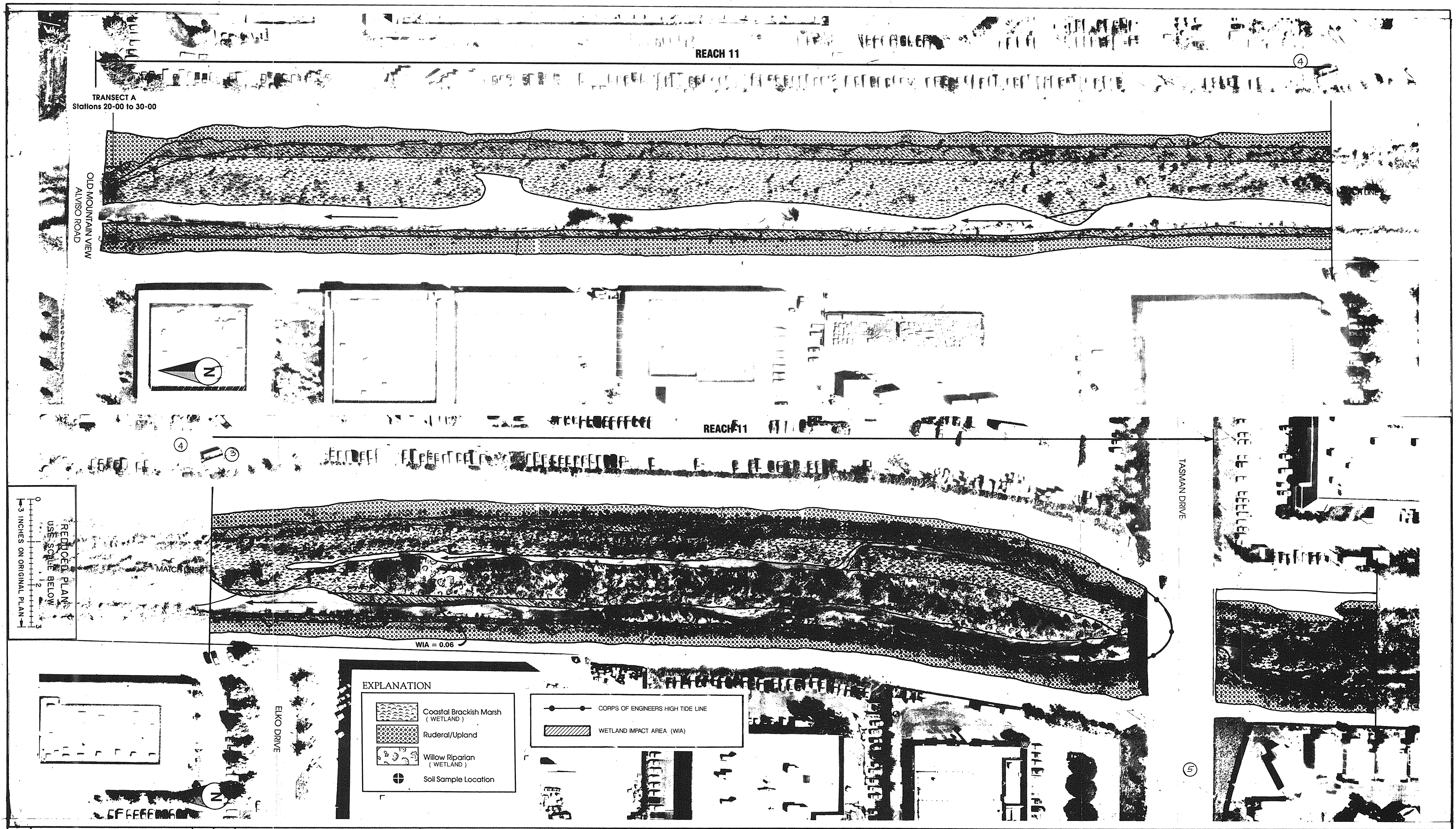
0 1 MILE

S-139

H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

USGS Quad Map: Reach 3A

File No. 672-02	Date 4/30/92	Figure 2


REACH 11
④
TRANSECT A
Stations 20-00 to 30-00
OLD MOUNTAIN VIEW ALVISO ROAD
MATCH LINE
N
REACH 11
④
③
TASMAN DRIVE
REDUCED PLAN USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN
MATCH LINE 2
WIA = 0.06
ELKO DRIVE
N
⑤
EXPLANATION
Coastal Brackish Marsh (WETLAND)
Ruderal/Upland
Willow Riparian (WETLAND)
Soil Sample Location
CORPS OF ENGINEERS HIGH TIDE LINE
WETLAND IMPACT AREA (WIA)

REV	DESCRIPTION	DATE	APPR.
	CORPS OF ENGINEERS JURISDICTIONAL AFIEA COE jurisdiction areas are all those areas shown between high tide lines and adjacent wetlands DATE OF PREPARATION: 5/90 DATE OF SUBMISSION: 10/92		

The Habitat Restoration Group

JOHN STANLEY & ASSOCIATES, INC.

6001 Butler Lane, Suite 1 • Scotts Valley, CA 95066 • (408) 438-4102 FAX (408) 438-1142 • Branch Office • 216 F Street No. 63 • Davis, CA 95616 • (916) 753-3905
California Landscape Contractors License #571037

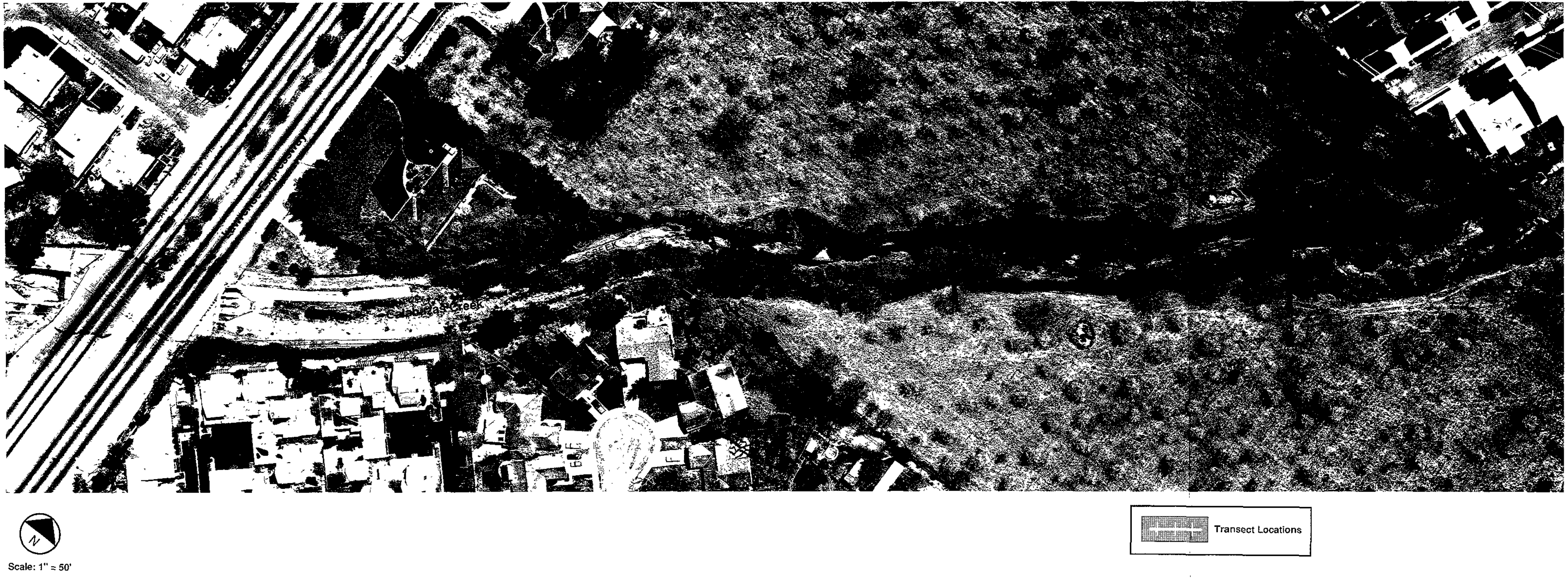
PHOTOGRAPHY BY: AIR FLIGHT SERVICE DATE: RECTIFICATION BY:

DATE 5-90
DESIGN
DRAWN
CHECKED

Santa Clara Valley Water District

CALABAZAS CREEK
Wetland Delineation
REACH 11
Old Mountain View Rd to Tasman Drive
FIGURE 3

SCALE 1" = 50'
SHEET 2 of 5
387-04



H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Calabazas Creek: Reference Site Location Map

File No 672-02	Date 5/7/92	Figure 3

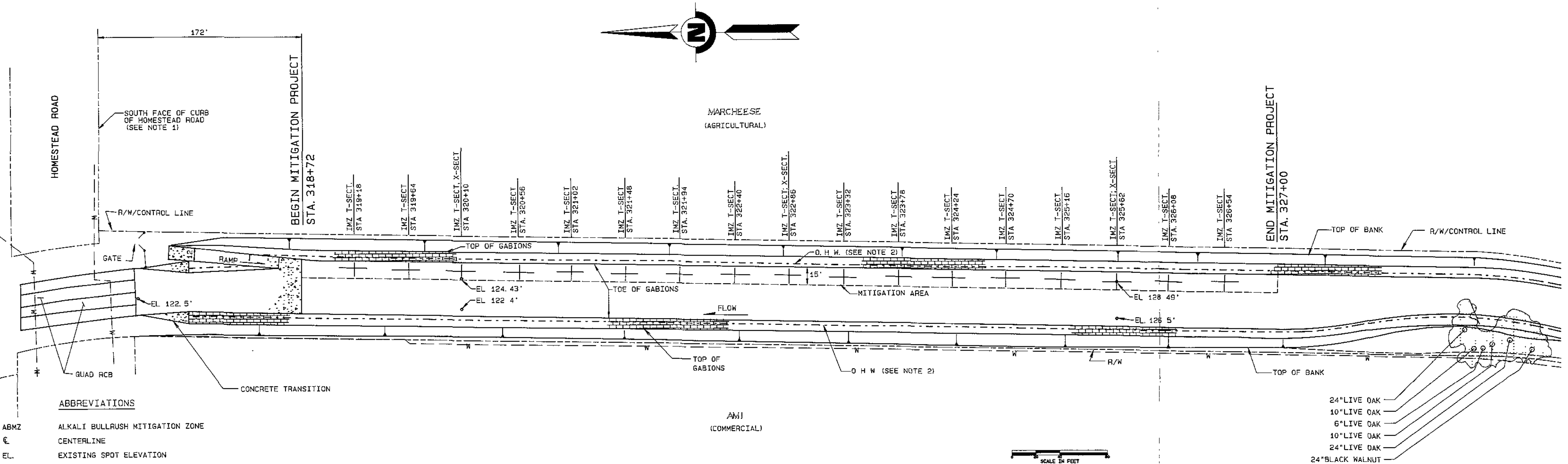
DESCRIPTION	DATE	APPR.
REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

PHOTOGRAPHY BY: AIR FLIGHT SERVICE DATE: 3-29-85 RECTIFICATION BY.

DATE	Santa Clara Valley Water District	
DESIGN		
DRAWN	Jeff Mick	
CHECKED	Randy Talley	

CALABAZAS CREEK
RIPARIAN HABITAT MITIGATION & MONITORING PLAN
REACH 3A
FIGURE 4

SCALE 1" = 50'
SHEET

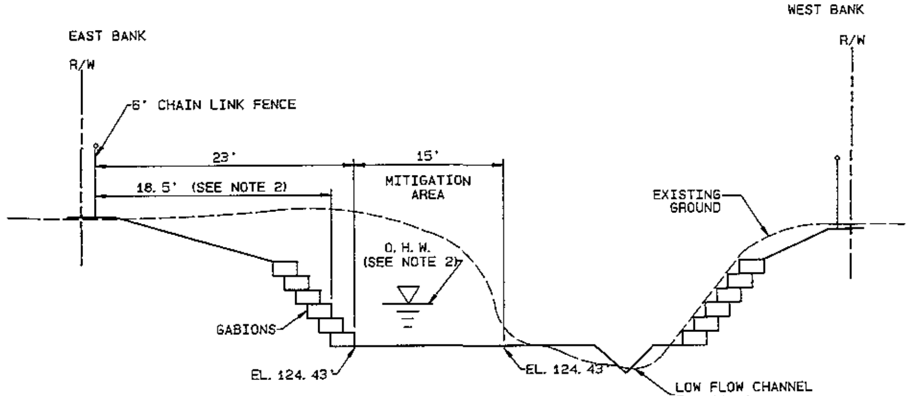


ABBREVIATIONS

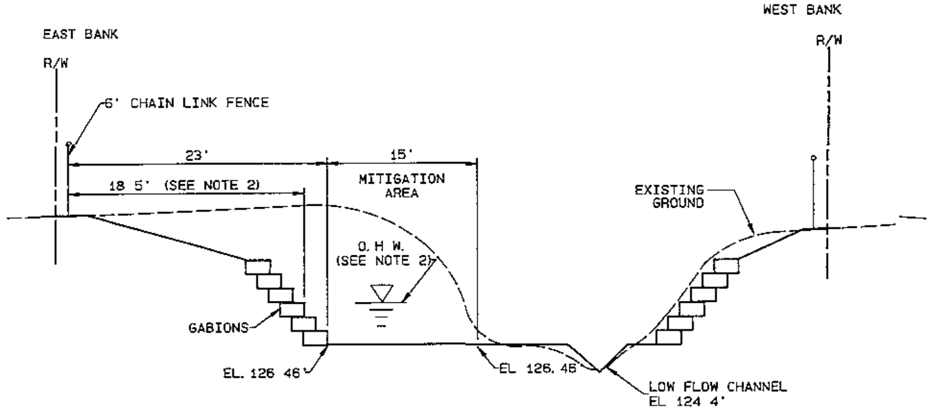
ABMZ	ALKALI BULLRUSH MITIGATION ZONE
℄	CENTERLINE
EL.	EXISTING SPOT ELEVATION
IMZ	INSTREAM MITIGATION ZONE
MZ	MITIGATION ZONE
OHW	ORDINARY HIGH WATER
R/W	RIGHT OF WAY
STA	STATION ALONG CONTROL LINE
T-SECT.	TRANSECT
TMZ	TRANSITION MITIGATION ZONE
X-SECT.	CROSS SECTION

LEGEND

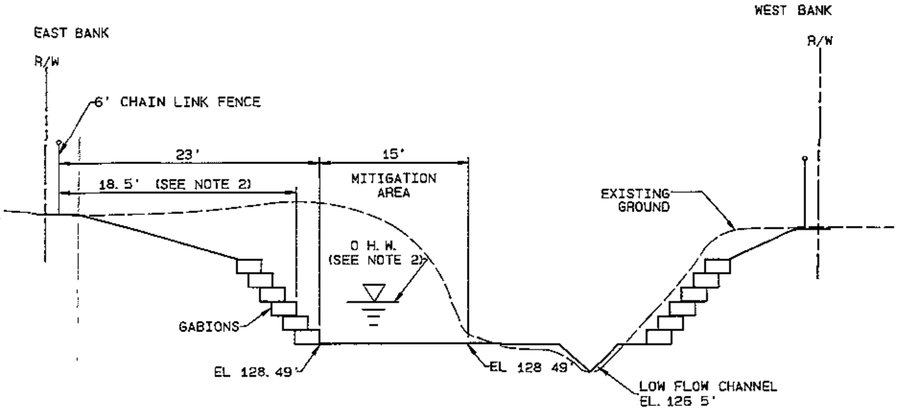
- - - - - -	*EXISTING GROUND/LEVEE*
———	POST FLOOD CONTROL PROJECT CONSTRUCTION LINE
··········	ARMY CORPS OF ENGINEERS JURISDICTION LINE
-·-·—-·-·—	POST FLOOD CONTROL PROJECT THALWAG LINE
- — - — - —	C. O. E. ORDINARY HIGH WATER
——— — ———	CONTROL LINE/RIGHT OF WAY LINE
⊤	SLOPE
+	TRANSECT LOCATION ABMZ MONITORING
▲	TRANSECT LOCATION TRANSITION ZONE REFERENCE
●	TRANSECT LOCATION TMZ MONITORING
▦	GABION SLOPE PROTECTION
▨	CONCRETE



CROSS SECTION
STA. 320+10
NTS
CROSS SECTION TAKEN
LOOKING UPSTREAM (SOUTH)



CROSS SECTION
STA. 322+86
NTS
CROSS SECTION TAKEN
LOOKING UPSTREAM (SOUTH)



CROSS SECTION
STA. 325+62
NTS
CROSS SECTION TAKEN
LOOKING UPSTREAM (SOUTH)

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

DESCRIPTION	DATE	APPR

REFERENCE INFORMATION AND NOTES
1. INSTREAM MITIGATION PROJECT BEGINS 172 FEET SOUTH OF FACE OF CURB SOUTH SIDE OF HOMESTEAD ROAD.
2. TYPICAL SECTIONS SHOW C. O E. ORDINARY HIGH WATER. (APPROX 4. 6 FOOT DEPTH)
3 DATE OF PREPARATION 5/92
4 DATE OF SUBMISSION 10/92

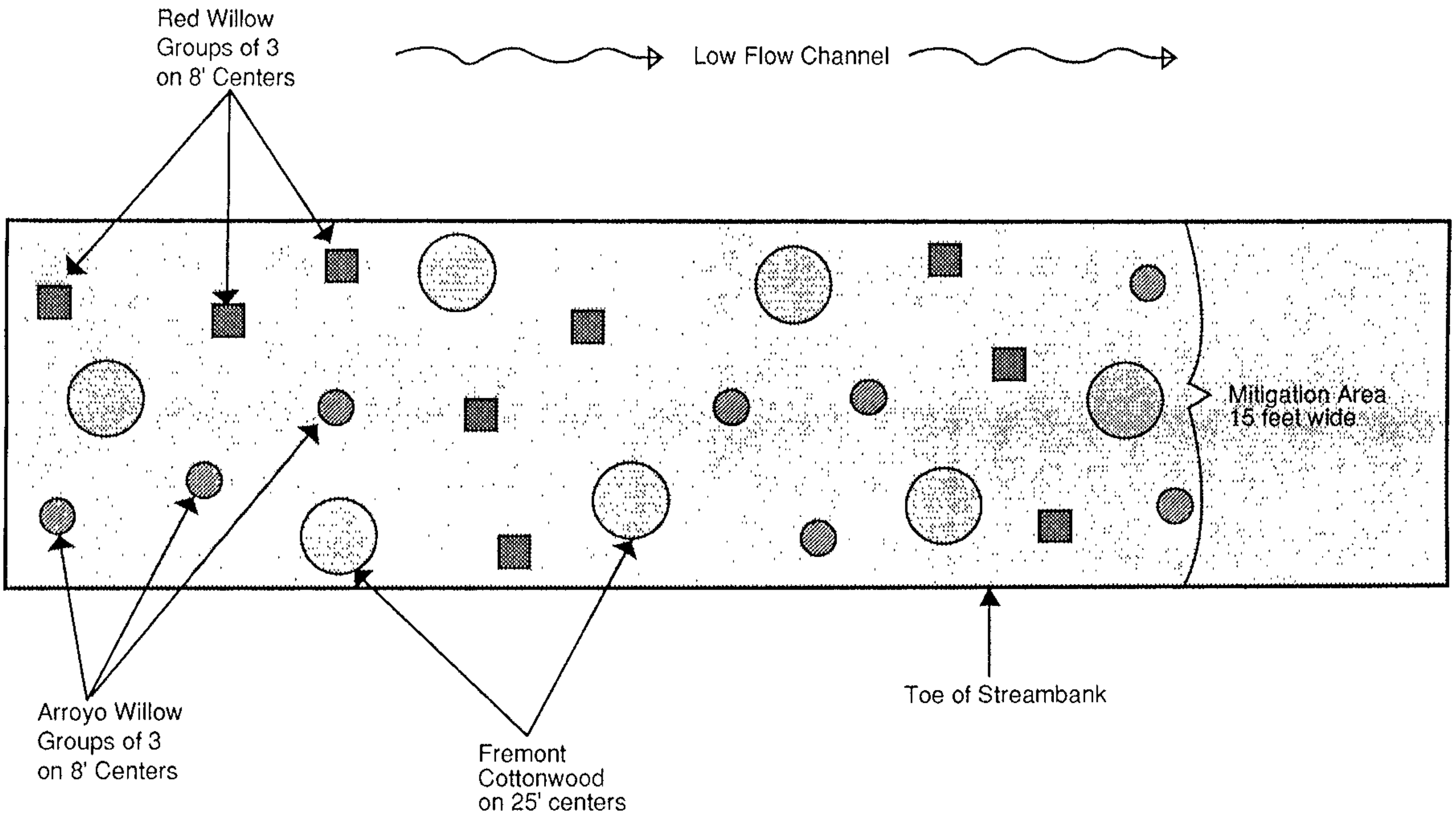
DATE 1/13/94
DESIGN KR/MM
DRAWN CM/SL
CHECKED KR

Santa Clara Valley Water District

PROJECT ENGINEER
DIVISION ENGINEER

CALABAZAS CREEK
REACH 3A
FIGURE 5

SCALE AS SHOWN
SHEET 5R



Not to Scale

H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Reach 3A: Typical Planting Configuration

File No. 672-02	Date 5/11/92	Figure 6

APPENDIX 2

Woody Plant Species Occurring Within the Streambed and Toe of the Streambank at the Reach 3A Mitigation Reference Site.

Baccharis pilularis ssp. consanguinea	coyote brush
Juglans hindsii	Cal. black walnut
Populus fremontii	Fremont cottonwood
Prunus sp.	plum
Rosa californica	Cal. wild rose
Rubus discolor	blackberry
Salix laevigata	red willow
Salix lasiolepis	arroyo willow
Sambucus mexicana	Mexican elderberry
Toxicodendron diversilobum	poison oak
Foeniculum vulgare	common fennel
Equisetum arvense	horsetail
Polygonum sp.	smartweed
Carex sp.	nutgrass

Woody Plant Species Occurring Within the Streambed and Toe of the Streambank at Reach 11.

Salix laevigata	red willow
Salix lasiolepis	arroyo willow
Salix hindsii	sandbar willow
Populus fremontii	Fremont cottonwood
Alnus rhombifolia	white alder
Equisetum arvense	horsetail

APPENDIX 3. WILDLIFE SPECIES LIST

(Expected to occur at the Impact Area and Reference Area of Reaches 3A and 11 of Calabazas Creek, Santa Clara County, California)

SPECIES

CLASS: AMPHIBIA (Amphibians)

ORDER: CAUDATA (Salamanders)
FAMILY: AMBYSTOMATIDAE (Mole Salamanders and Relatives)
California Tiger Salamander (*Ambystoma tigrinum californiense*)
FAMILY: PLETHODONTIDAE (Lungless Salamanders)
California Slender Salamander (*Batrachoseps attenuatus*)
Arboreal Salamander (*Aneides lugubris*)

ORDER: SALIENTIA (Frogs and Toads)
FAMILY: BUFONIDAE (True Toads)
Western Toad (*Bufo boreas*)
FAMILY: HYLIDAE (Treefrogs and Relatives)
Pacific Treefrog (*Pseudacris regilla*)
FAMILY: RANIDAE (True Frogs)
California Red-legged Frog (*Rana aurora draytoni*)
Bullfrog (*Rana catesbeiana*)

CLASS: REPTILIA (Reptiles)

ORDER: TESTUDINES (Turtles)
FAMILY: EMYDIDAE (Pond and Marsh Turtles)
Western Pond Turtle (*Clemmys marmorata*)

ORDER: SQUAMATA (Lizards and Snakes)
SUBORDER: SAURIA (Lizards)
FAMILY: IGUANIDAE (Iguanids)
Western Fence Lizard (*Sceloporus occidentalis*)
FAMILY: SCINCIDAE (Skinks)
Western Skink (*Eumeces skiltonianus*)
FAMILY: ANGUIDAE (Alligator Lizards and Relatives)
Southern Alligator Lizard (*Elgaria multicarinata*)

SUBORDER: SERPENTES (Snakes)
FAMILY: COLUBRIDAE (Colubrids)
Gopher Snake (*Pituophis melanoleucus*)
Common Garter Snake (*Thamnophis sirtalis*)

SPECIES

CLASS: AVES (Birds)

ORDER: CICONIIFORMES (Herons, Storks, Ibises, and Relatives)
FAMILY: ARDEIDAE (Herons and Bitterns)
Great Blue Heron (*Ardea herodias*)
Great Egret (*Casmerodius albus*)
Snowy Egret (*Egretta thula*)
Green-backed Heron (*Butorides striatus*)
Black-crowned Night Heron (*Nycticorax nycticorax*)

ORDER: ANSERIFORMES (Screamers, Ducks, and Relatives)
FAMILY: ANATIDAE (Swans, Geese, and Ducks)
Mallard (*Anas platyrhynchos*)

ORDER: FALCONIFORMES (Vultures, Hawks, and Falcons)
FAMILY: CATHARTIDAE (New World Vultures)
Turkey Vulture (*Cathartes aura*)
FAMILY: ACCIPITRIDAE (Hawks, Old World Vultures, and Harriers)
Black-shouldered Kite (*Elanus caeruleus*)
Sharp-shinned Hawk (*Accipiter striatus*)
Cooper's Hawk (*Accipiter cooperii*)
Red-shouldered Hawk (*Buteo lineatus*)
Red-tailed Hawk (*Buteo jamaicensis*)
FAMILY: FALCONIDAE (Caracaras and Falcons)
American Kestrel (*Falco sparverius*)
Merlin (*Falco columbarius*)

ORDER: GALLIFORMES (Megapodes, Currassows, Pheasants, and Relatives)
FAMILY: PHASIANIDAE (Quails, Pheasants, and Relatives)
California Quail (*Callipepla californica*)

ORDER: CHARADRIIFORMES (Shorebirds, Gulls, and Relatives)
FAMILY: CHARADRIIDAE (Plovers and Relatives)
Killdeer (*Charadrius vociferus*)
FAMILY: SCOLOPACIDAE (Sandpipers and Relatives)
Greater Yellowlegs (*Tringa melanoleuca*)
Lesser Yellowlegs (*Tringa flavipes*)
Spotted Sandpiper (*Actitis macularia*)
Western Sandpiper (*Calidris mauri*)
Least Sandpiper (*Calidris minutilla*)
Short-billed Dowitcher (*Limnodromus griseus*)

Long-billed Dowitcher (*Limnodromus scolopaceus*)
Common Snipe (*Gallinago gallinago*)

ORDER: COLUMBIFORMES (Pigeons and Doves)
FAMILY: COLUMBIDAE (Pigeons and Doves)
Rock Dove (*Columba livia*)
Mourning Dove (*Zenaida macroura*)

ORDER: STRIGIFORMES (Owls)
FAMILY: TYTONIDAE (Barn Owls)
Common Barn Owl (*Tyto alba*)
FAMILY: STRIGIDAE (Typical Owls)
Western Screech Owl (*Otus kennicottii*)
Great Horned Owl (*Bubo virginianus*)

ORDER: APODIFORMES (Swifts and Hummingbirds)
FAMILY: APODIDAE (Swifts)
Vaux's Swift (*Chaetura vauxi*)
White-throated Swift (*Aeronautes saxatalis*)
FAMILY: TROCHILIDAE (Hummingbirds)
Anna's Hummingbird (*Calypte anna*)
Rufous Hummingbird (*Selasphorus rufus*)
Allen's Hummingbird (*Selasphorus sasin*)

ORDER: CORACIIFORMES (Kingfishers and Relatives)
FAMILY: ALCEDINIDAE (Kingfishers)
Belted Kingfisher (*Ceryle alcyon*)

ORDER: PICIFORMES (Woodpeckers and Relatives)
FAMILY: PICIDAE (Woodpeckers and Wrynecks)
Red-breasted Sapsucker (*Sphyrapicus ruber*)
Nuttall's Woodpecker (*Picoides nuttallii*)
Downy Woodpecker (*Picoides pubescens*)
Northern Flicker (*Colaptes auratus*)

ORDER: PASSERIFORMES (Perching Birds)
FAMILY: TYRANNIDAE (Tyrant Flycatchers)
Western Wood-Pewee (*Contopus sordidulus*)
Willow Flycatcher (*Empidonax traillii*)
Hammond's Flycatcher (*Empidonax hammondii*)
Dusky Flycatcher (*Empidonax oberholseri*)

SPECIES

Pacific Slope Flycatcher (*Empidonax difficilis*)
Black Phoebe (*Sayornis nigricans*)
Say's Phoebe (*Sayornis saya*)
Ash-throated Flycatcher (*Myiarchus cinerascens*)
Western Kingbird (*Tyrannus verticalis*)
FAMILY: HIRUNDINIDAE (Swallows)
Tree Swallow (*Tachycineta bicolor*)
Violet-green Swallow (*Tachycineta thalassina*)
Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)
Cliff Swallow (*Hirundo rustica*)
Barn Swallow (*Hirundo rustica*)
FAMILY: CORVIDAE (Jays, Magpies, and Crows)
Scrub Jay (*Aphelocoma coerulescens*)
American Crow (*Corvus brachyrhynchos*)
FAMILY: PARIDAE (Titmice)
Chestnut-backed Chickadee (*Parus rufescens*)
Plain Titmouse (*Parus inornatus*)
FAMILY: AEGITHALIDAE (Bushtits)
Bushtit (*Psaltriparus minimus*)
FAMILY: CERTHIIDAE (Creepers)
Brown Creeper (*Certhia americana*)
FAMILY: TROGLODYTIDAE (Wrens)
Bewick's Wren (*Thryomanes bewickii*)
House Wren (*Troglodytes aedon*)
Winter Wren (*Troglodytes troglodytes*)
FAMILY: MUSCICAPIDAE (Old World Warblers, Gnatcatchers, Kinglets, Thrushes, Bluebirds, and Wrentit)
Golden-crowned Kinglet (*Regulus satrapa*)
Ruby-crowned Kinglet (*Regulus calendula*)
Blue-gray Gnatcatcher (*Polioptila caerulea*)
Western Bluebird (*Sialia mexicana*)
Swainson's Thrush (*Catharus ustulatus*)
Hermit Thrush (*Catharus guttatus*)
American Robin (Turdus migratorius)
Varied Thrush (*Ixoreus naevius*)
Wrentit (*Chamaea fasciata*)
FAMILY: MIMIDAE (Mockingbirds and Thrashers)
Northern Mockingbird (*Mimus polyglottos*)
FAMILY: MOTACILLIDAE (Wagtails and Pipits)
American Pipit (*Anthus spinoletta*)

SPECIES

FAMILY: BOMBYCILLIDAE (Waxwings)
Cedar Waxwing (*Bombycilla cedrorum*)
FAMILY: LANIIDAE (Shrikes)
Loggerhead Shrike (*Lanius ludovicianus*)
FAMILY: STURNIDAE (Starlings)
European Starling (*Sturnus vulgaris*)
FAMILY: VIREONIDAE (Typical Vireos)
Solitary Vireo (*Vireo solitarius*)
Warbling Vireo (*Vireo gilvus*)
FAMILY: EMBERIZIDAE (Wood Warblers, Sparrows, Blackbirds, and Relatives)
Orange-crowned Warbler (*Vermivora celata*)
Nashville Warbler (*Vermivora ruficapilla*)
Yellow Warbler (*Dendroica petechia*)
Yellow-rumped Warbler (*Dendroica coronata*)
Black-throated Gray Warbler (*Dendroica nigrescens*)
Townsend's Warbler (*Dendroica townsendi*)
Hermit Warbler (*Dendroica occidentalis*)
MacGillivray's Warbler (*Oporornis tolmiei*)
Common Yellowthroat (*Geothlypis trichas*)
Wilson's Warbler (*Wilsonia pusilla*)
Western Tanager (*Piranga ludoviciana*)
Black-headed Grosbeak (*Pheucticus melanocephalus*)
Lazuli Bunting (*Passerina amoena*)
Rufous-sided Towhee (*Pipilo erythrophthalmus*)
California Towhee (*Pipilo crissalis*)
Fox Sparrow (*Passerella iliaca*)
Song Sparrow (*Melospiza melodia*)
Lincoln's Sparrow (*Melospiza lincolnii*)
Golden-crowned Sparrow (*Zonotrichia atricapilla*)
White-crowned Sparrow (*Zonotrichia leucophrys*)
Dark-eyed Junco (*Junco hyemalis*)
Red-winged Blackbird (*Agelaius phoeniceus*)
Brewer's Blackbird (*Euphagus cyanocephalus*)
Brown-headed Cowbird (*Molothrus ater*)
Hooded Oriole (*Icterus cucullatus*)
Northern Oriole (*Icterus galbula*)
FAMILY: FRINGILLIDAE (Finches)
Purple Finch (*Carpodacus purpureus*)
House Finch (*Carpodacus mexicanus*)
Lesser Goldfinch (*Carduelis psaltria*)
American Goldfinch (*Carduelis tristis*)

SPECIES

FAMILY: PASSERIDAE (Weaver Finches)
House Sparrow (*Passer domesticus*)

CLASS: MAMMALIA (Mammals)

ORDER: MARSUPIALIA (Opossums, Kangaroos, and Relatives)
FAMILY: DIDELPHIDAE (Opossums)
Virginia Opossum (*Didelphis virginiana*)

ORDER: INSECTIVORA (Shrews and Moles)
FAMILY: SORICIDAE (Shrews)
Ornate Shrew,(*Sorex ornatus*)
FAMILY: TALPIDAE (Moles)
Broad-footed Mole (*Scapanus latimanus*)

ORDER: CHIROPTERA (Bats)
FAMILY: VESPERTILIONIDAE (Vespertilionid Bats)
Yuma Myotis (*Myotis yumanensis*)
Long-eared Myotis (*Myotis evotis*)
Fringed Myotis (*Myotis thysanodes*)
California Myotis (*Myotis californicus*)
Western Pipistrelle (*Pipistrellus hesperus*)
Big Brown Bat (*Eptesicus fuscus*)
Western Red Bat (*Lasiurus blossevillii*)
Hoary Bat (*Lasiurus cinereus*)
FAMILY: MOLOSSIDAE (Free-tailed Bat)
Brazilian Free-tailed Bat (*Tadarida brasiliensis*)

ORDER: LAGOMORPHA (Rabbits, Hares, and Pikas)
FAMILY: LEPORIDAE (Rabbits and Hares)
Brush Rabbit (*Sylvilagus bachmani*)
Desert Cottontail (*Sylvilagus audubonii*)
Black-tailed Hare (*Lepus californicus*)

ORDER: RODENTIA (Squirrels, Rats, Mice, and Relatives)
FAMILY: SCIURIDAE (Squirrels, Chipmunks, and Marmots)
California Ground Squirrel (*Spermophilus beecheyi*)
Gray Squirrel (*Sciurus carolinensis*)
Fox Squirrel (*Sciurus niger*)

SPECIES

FAMILY: GEOMYIDAE (Pocket Gophers)
Botta's Pocket Gopher (*Thomomys bottae*)
FAMILY: CRICETIDAE (Deer Mice, Voles, and Relatives)
California Mouse (*Peromyscus californicus*)
Deer Mouse (*Peromyscus maniculatus*)
California Vole (*Microtus californicus*)
FAMILY: MURIDAE (Old World Rats and Mice)
Black Rat (*Rattus rattus*)
Norway Rat (*Rattus norvegicus*)
House Mouse (*Mus musculus*)

ORDER: CARNIVORA (Carnivores)
FAMILY: PROCYONIDAE (Raccoons and Relatives)
Raccoon (*Procyon lotor*)
FAMILY: MUSTELIDAE (Weasels, Badgers, and Relatives)
Long-tailed Weasel (*Mustela frenata*)
Striped Skunk (*Mephitis mephitis*)

APPENDIX 4

PROJECT IMPLEMENTATION SCHEDULE

Calabazas Creek; Reach 3A

Project Implementation Schedule

	<	--	9	4	--	>	<	--	--	--	--	9	5	--	--	--	--	>	<	--	--	--	--	9	6	--	--	--	--	>	<	--	9	7	--	>	>	2	0	0	2
ACTIVITY	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J					
construct flood control channel	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■																								
initiate mitigation process																		■																							
obtain as-built mapping																		■	■																						
contract mitigation consultant																		■	■																						
prep. mitigation const. plans and specs																			■	■	■	■																			
advertise mitigation const. project																							■																		
award mitigation const. contract																								■																	
issue notice to proceed																									■																
site preparation																									■	■	■	■													
install mitigation plants																													■	■	■										
mitigation completion notice to C.O.E.																															■										
monitoring																															■	■	■	■	■	■	■	■	■	■	

APPENDIX 5

SAMPLE DATA COLLECTION SHEETS

H.T. HARVEY and ASSOCIATES
906 Elizabeth Street Alviso CA tel: (408) 263-1814

LINE TRANSECT FIELD SAMPLING DATA SHEET

Site:

Date: / /

Data collected by:

Page . of

TRANSECT		BEG	END	DIST	BEG	END	DIST	BEG	END	DIST	BEG	END	DIST	TOTAL
	species													
	species													
	species													
	species													
	species													
	species													
	species													
	species													
	species													
	species													
	species													
	species													

H.T. HARVEY and ASSOCIATES
906 Elizabeth Street Alviso CA tel: (408) 263-1814

SURVIVAL DATA SHEET

Site:

Date: / /

Data collected by:

Page of

SPECIES	COND	
	ALIVE	
	DEAD	
	ALIVE	
	DEAD	
	ALIVE	
	DEAD	
	ALIVE	
	DEAD	
	ALIVE	
	DEAD	
	ALIVE	
	DEAD	
	ALIVE	
	DEAD	
	ALIVE	
	DEAD	
	ALIVE	
	DEAD	
	ALIVE	
	DEAD	
	ALIVE	
	DEAD	
	ALIVE	
	DEAD	

H.T. HARVEY and ASSOCIATES
906 Elizabeth Street Alviso CA tel: (408) 263-1814

INDIVIDUAL PLANT DATA SHEET

Site:

Date: / /

Data collected by:

Page of

SPECIES	NUMBER	HEIGHT	NOTES

APPENDIX S-II

RIPARIAN HABITAT MITIGATION AND MONITORING PLAN FOR IMPACTS OUTSIDE CORPS JURISDICTION

MITIGATION GOALS

The primary goal of this mitigation plan is to design 8.3 acres of riparian habitat in Reaches 1-8 (from Lawrence Expressway to Miller Avenue) of Calabazas Creek as mitigation for construction impacts throughout these reaches. The project location is shown on Figure 1. This report addresses only Reaches 1-8 of the flood control project since riparian habitat is limited to these reaches. The proposed habitat will support a variety of native riparian plants. Once established, these plants will provide functional habitat for wildlife species commonly found in riparian habitat. An analysis using the Habitat Evaluation Procedure (HEP) has determined that habitat values of the restored site are expected to more than compensate for the losses in the impacted areas (Sanders, June 17, 1987, Appendix S-III).

EXISTING SITE CONDITIONS

Vegetation

The upper reaches of Calabazas Creek, from Lawrence Expressway to Miller Avenue (Reaches 1-8), consist primarily of an eroding earth-lined channel with intermittent areas of rock riprap and concrete rubble. A riparian plant community exists along the banks of these reaches although historical agriculture and existing urban uses on adjacent lands have resulted in the dominance of nonnative plants and a relatively sparse understory. Dominant native riparian trees, including coast live oak (Quercus agrifolia), valley oak (Q. lobata), willow (Salix spp.) blue elderberry (Sambucus mexicana), and California sycamore (Platanus racemosa), tend to occur at the channel toe or top of the bank. Poison oak (Toxicodendron diversiloba), coyote brush (Baccharis pilularis consanguinea), mule fat (B. viminea), California coffeeberry (Rhamnus californica) and California blackberry (Rubus ursinus) are common native shrubs. Numerous ornamental plants occur at the top of the bank where they have spread from neighboring backyards. There are also some remnant fruit and nut trees at the top of the bank.

Soils

The soils in Reaches 1-8 include two categories of native alluvial deposits described by the Soil Conservation Service as Yolo Silty Clay Loam and Zomora Clay Loam. Both categories consist of well drained soils having moderately fine textured subsoils underlain by alluvium of sedimentary and mixed origin.

The Yolo Series has surface soil ranging in thickness from 26 to 32 inches and is grayish-brown, neutral, and mildly alkaline loam or silty clay loam. The subsoil and substratum are a brown, mildly alkaline silt loam or silty clay loam, and extends to a depth of 60 inches or more. These soils are considered to be the most productive ones in Santa Clara County.

The Zamora Series have surface soil ranging in thickness from 12 to 20 inches and is dark grayish-brown, neutral loam or clay loam. The subsoil is a dark brown or brown, neutral clay loam, ranging from 20 inches to 30 inches in thickness. The substratum is stratified, gravely, sandy clay loam, and fine sandy clay loam alluvium.

There is severe erosion along the majority of the channel banks caused by high velocity flood flows. This erosion has caused considerable topsoil loss and has created a chronic unstable condition.

Hydrology

About 90 percent of the rainfall takes place in 5 months of the year, November through March.

The Santa Clara Valley Water District's groundwater recharge program discharges water into Calabazas Creek upstream of the project reaches. This creates effluent channel conditions in the project reaches. The program attempts to maximize groundwater recharge by maintaining flow year-round in Calabazas Creek from the raw water distribution pipeline outfall to Lawrence Expressway.

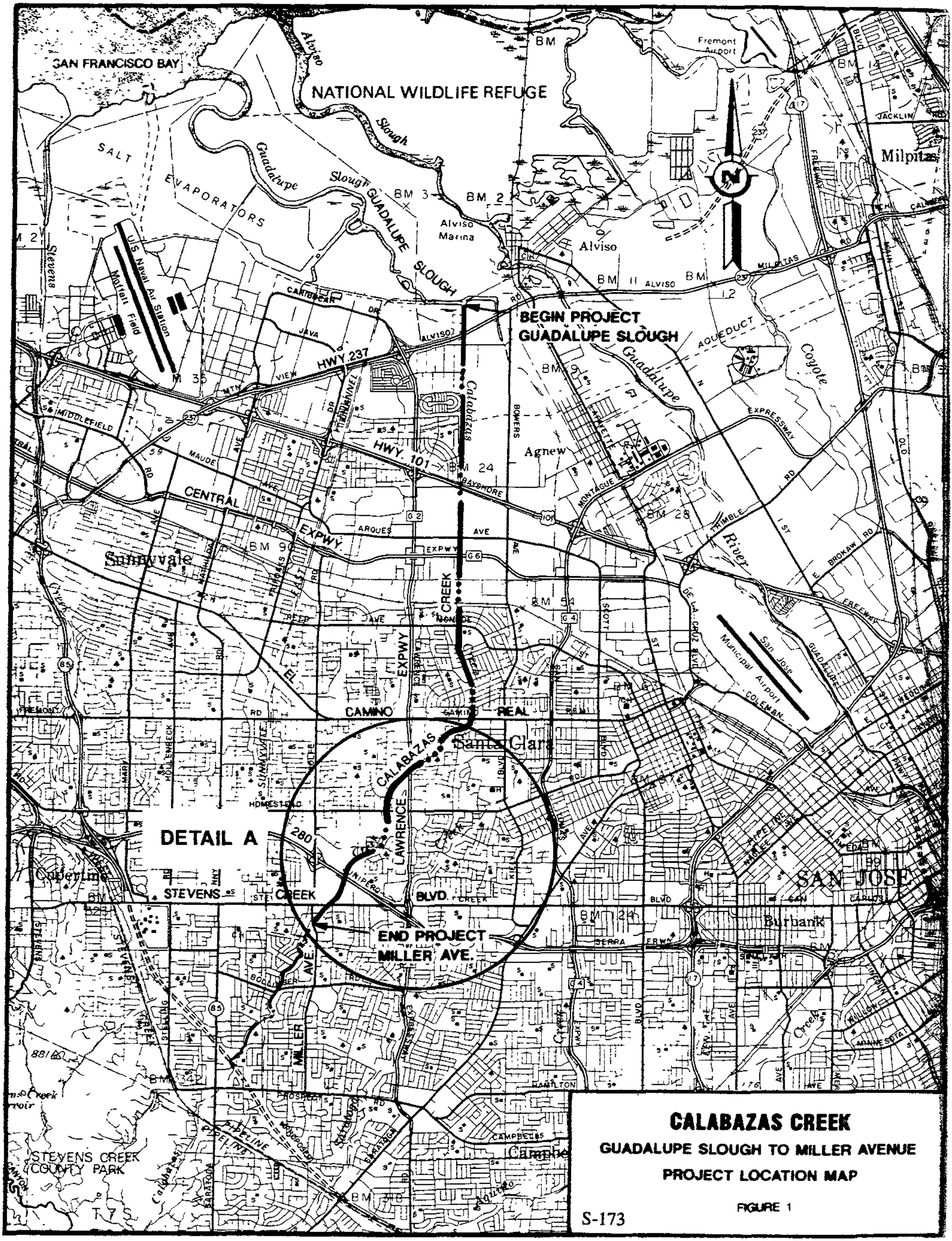
SITE PREPARATION

Construction of the flood control project will establish a base condition for the revegetation project. During project construction, the banks of the channel in Reaches 1-8 will be lined with either stepped or mattress gabions, and in some reaches the existing channel will be enlarged. Main irrigation lines will be installed to planter boxes incorporated within the gabion structures. After construction of the flood control improvements, native riparian plants will be installed in the planter boxes of the upper four courses of the stepped gabions, in the upper two courses of the mattress gabions, and in the earth slopes and flat areas along the upper channel margins within the right of way. Figure 10A shows the channel geometry for stepped gabions and Figure 10B shows the channel geometry for mattress gabions. This design will result in the reestablishment of a total of 8.3 acres of riparian vegetation along Reaches 1-8 of Calabazas Creek.

Placement of the stepped and mattress gabions has been designed to protect existing trees where possible. These trees will be incorporated into the revegetation design.

In areas where gabions will be constructed on engineered fill, the gabions need to be modified in order for larger plants to become established. Engineered fill is highly compacted and consequently it is virtually impenetrable by plant roots. The gabion design has been modified to provide planting areas with pilot root tubes which will allow root penetration through the surrounding gabion structure down to native soils. As shown in Figure 11, a pilot root tube of 12 inches in diameter will be placed beneath the planter box. This pilot root tube consists of a perforated biodegradable conduit filled with a planting mix soil, which will extend through the gabion structure as deep as native soil or the adjacent channel bottom, whichever is less.

Some planter boxes in gabions will not be provided with pilot root tubes. Planter boxes which will be planted with shrubs and ground covers that are tolerant of the limited root zones available in boxes will not require pilot root tubes. In addition, planter boxes in gabions constructed against cut banks will be in contact with uncompacted native soils and no special modification will be necessary to provide adequate conditions for plant growth.



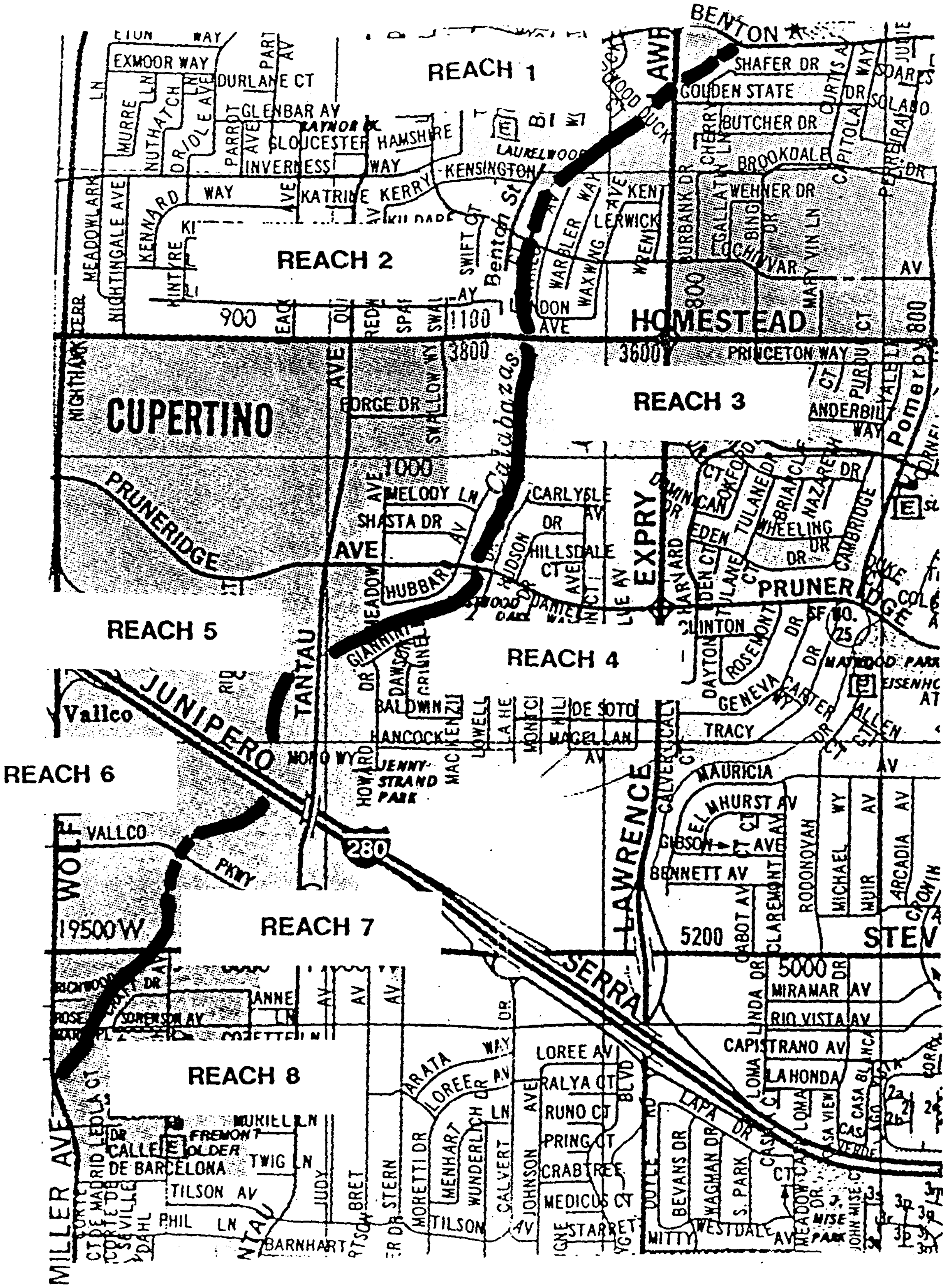
CALABAZAS CREEK

GUADALUPE SLOUGH TO MILLER AVENUE

PROJECT LOCATION MAP

FIGURE 1

S-173


REACH 1
REACH 2
REACH 3
REACH 4
REACH 5
REACH 6
REACH 7
REACH 8
CUPERTINO
HOMESTEAD
PRUNERIDGE AVE
Calabazas
Benton St
BENTON
JUNIPERO SERRA
280
TANTAU AVE
LAWRENCE EXPRY
WOLFE
MILLER AVE
VALLCO PKWY
Vallco
STEV
19500 W
5200
5000
3800
3600
900
1100
1000
800
EXMOOR WAY
GOLDEN STATE
SHAFER DR
BUTCHER DR
KENSINGTON
PRINCETON WAY
MELODY LN
SHASTA DR
CARLYSLE AV
HILLSDALE CT
GENEVA
TRACY
MAURICIA
BENNETT AV
MIRAMAR AV
RIO VISTA AV
CAPISTRANO AV
LA HONDA
LOREE AV
TILSON AV
BARNHART
JENNY STRAND PARK
J. MISE PARK

DETAIL A

PLANT ASSOCIATIONS AND LOCATIONS

The plant species selected for revegetation are those native to riparian communities in Santa Clara Valley. Species type, density, and location on the channel bank were carefully selected by several methods. The species type and number of plants required to replace wildlife values lost by removal of existing riparian vegetation were determined by the HEP analysis (Appendix S-III).

The planting density is based on the District's past experience from the Saratoga Creek revegetation project, a design which also included planting in stepped and mattress gabions. Monitoring of the Saratoga project has indicated that densities of 450 plants per acre in the gabions and 600 plants per acre in the earthen bank areas will result in the desired plant densities. Because of the inclusion of pilot root tubes in the gabion design, better long-term performance is expected in some locations of the Calabazas revegetation project than was obtained in the Saratoga Creek project.

Plant location was determined by matching expected postconstruction conditions with the characteristic moisture requirements, growth patterns, sun/shade tolerance, habitat role, and aesthetic effect of each species. Typical planting arrangements are shown on the plates in Appendix S-VI.

Two plant associations will be represented in this riparian mitigation plan: stream bank and sycamore-oak woodland. These two plant associations can be divided into several zones as shown in Figures 10A and 10B according to their location above the channel bottom.

Zones A and B are located in the channel bottom and the lower 4 feet of the gabion channel lining. No revegetation efforts are proposed in these zones as part of the mitigation plan for impacts to riparian habitat.

The Streambank Association will be principally planted in Zone C. Zone C is located in the gabion channel lining from a point 4 feet above the channel bottom to the top of the lining. Species have been selected for this zone which are compatible with the gabion structure (Table 1).

The Sycamore-Oak Woodland Association will be principally planted in Zones D and E. Zone D is located between the top of the gabion channel lining and the top of the bank. This zone will be either sloping or flat depending on the grading necessary for placement of the gabions on the lower bank. Zone E is located between the top of the channel bank and the boundary of the District's right of way. This zone will generally consist of flat, narrow areas which will not be disturbed by construction. Riparian trees and shrubs of the Sycamore-Oak Woodland Association (Table 2) will be intermixed with existing trees which will be preserved during construction.

CONCEPTUAL PLANTING PLAN

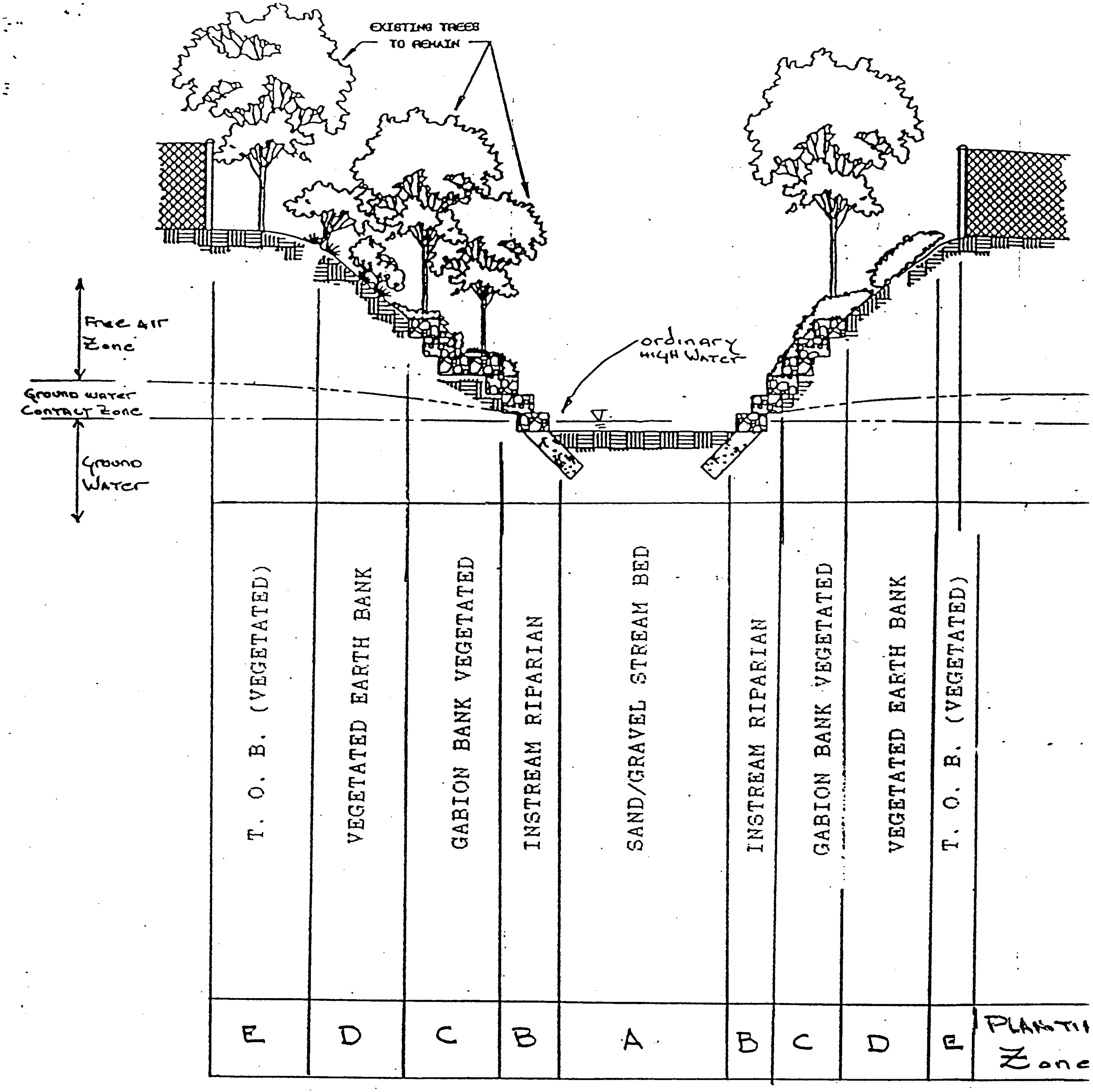
Trees and shrubs for the revegetation of the Streambank and Sycamore-Oak Woodland Associations will be contract-grown for transplantation onto the site. Dee and tree pots will typically be used since these pot designs prevent root-binding and result in better transplants.

The District will require that the nursery supplying the plant materials meet standards regarding plant disease and insect control, quality and size, vigor and health, and unbroken root systems. Propagules for container plants will be taken from the project region where possible. Plants will be grown under similar climatic conditions to that existing at the project site.

Installation of revegetation shall be undertaken in fall or early winter to coincide with the planting season, and shall be implemented within 12 months of completion of the flood control improvements. If scheduling is not feasible in the first planting season after construction is complete, then the period may be extended up to 18 months.

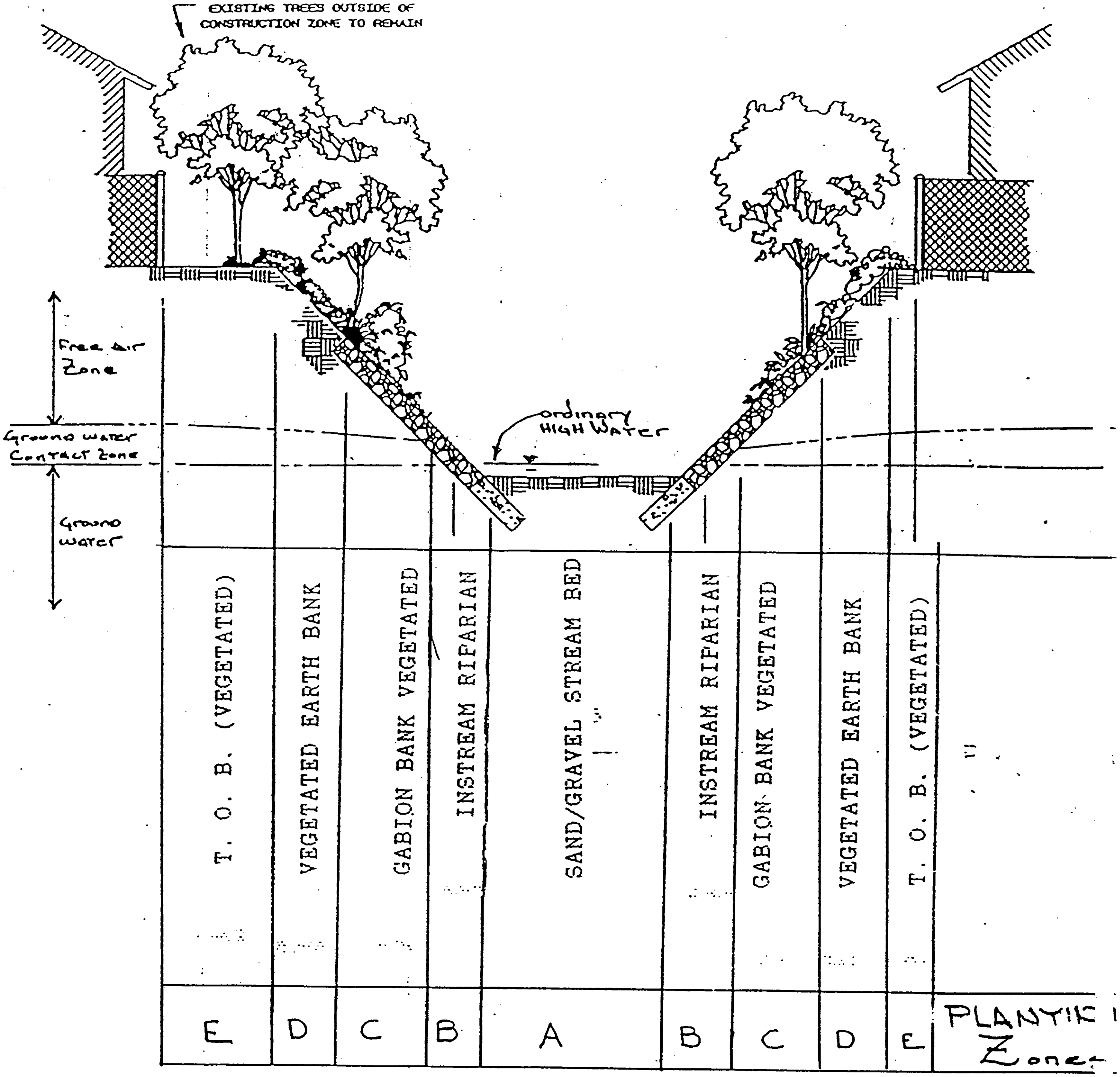
For trees and shrubs to be placed on the bank above the gabions or on the top of the slope, a planting hole will be augured a minimum of 3 feet in depth. The hole will be backfilled with a planting mix. Fertilizer tablets and mulch will be used at time of planting. Irrigation will consist of a regulated drip system. Reclaimed water will be used in the event of extended drought.

Planting mixes will be used in the gabions and in the pilot root tubes. Fertilizer, mulch, and drip irrigation will also be used for the gabion plantings.



CHANNEL GEOMETRY

FIGURE 10A



CHANNEL GEOMETRY

FIGURE 10B

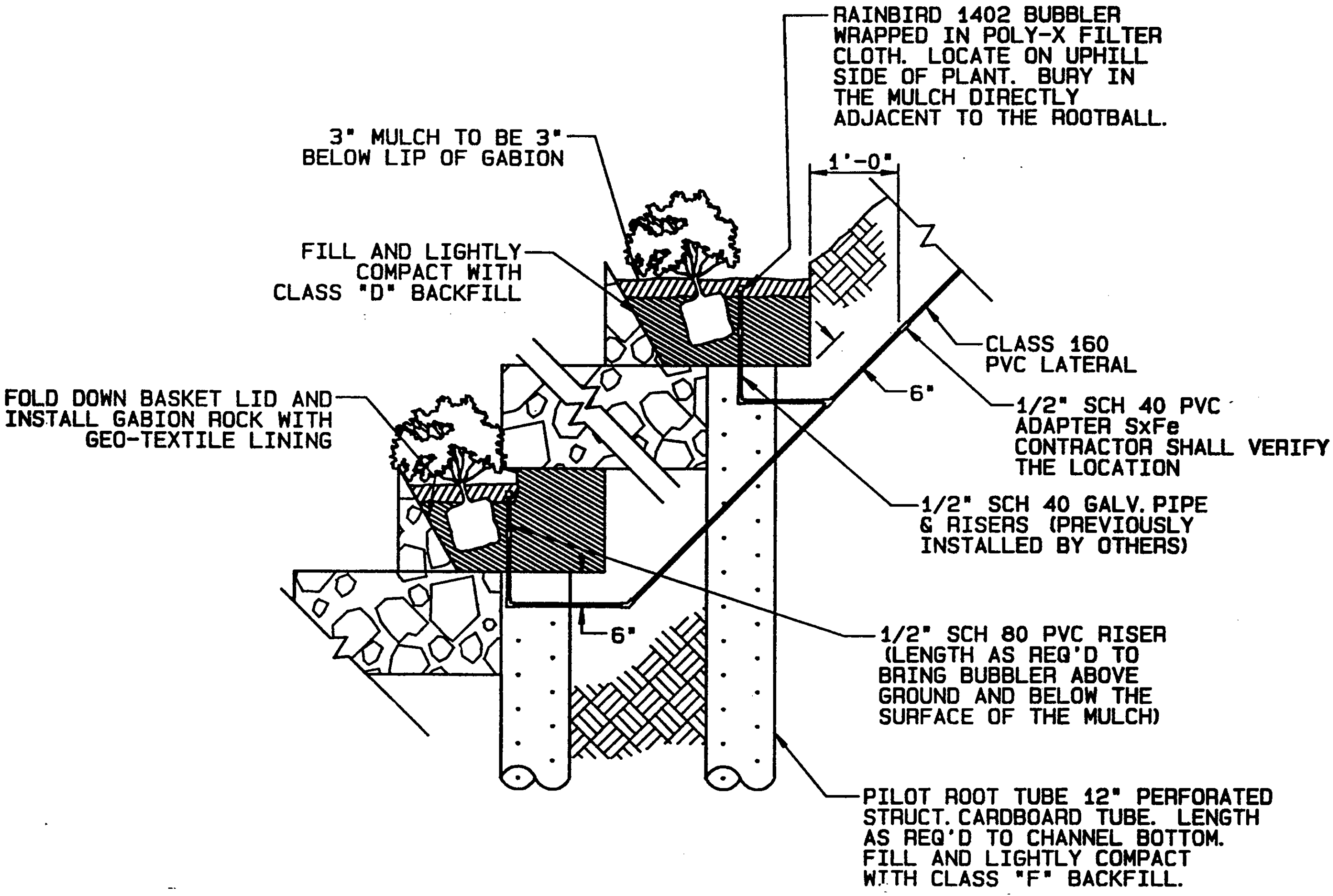

RAINBIRD 1402 BUBBLER WRAPPED IN POLY-X FILTER CLOTH. LOCATE ON UPHILL SIDE OF PLANT. BURY IN THE MULCH DIRECTLY ADJACENT TO THE ROOTBALL.
3" MULCH TO BE 3" BELOW LIP OF GABION
1'-0"
FILL AND LIGHTLY COMPACT WITH CLASS "D" BACKFILL
CLASS 160 PVC LATERAL
6"
1/2" SCH 40 PVC ADAPTER SxFe CONTRACTOR SHALL VERIFY THE LOCATION
FOLD DOWN BASKET LID AND INSTALL GABION ROCK WITH GEO-TEXTILE LINING
1/2" SCH 40 GALV. PIPE & RISERS (PREVIOUSLY INSTALLED BY OTHERS)
1/2" SCH 80 PVC RISER (LENGTH AS REQ'D TO BRING BUBBLER ABOVE GROUND AND BELOW THE SURFACE OF THE MULCH)
6"
PILOT ROOT TUBE 12" PERFORATED STRUCT. CARDBOARD TUBE. LENGTH AS REQ'D TO CHANNEL BOTTOM. FILL AND LIGHTLY COMPACT WITH CLASS "F" BACKFILL.

FIGURE 11

TABLE 1
Streambank Association—Proposed Species List

TREES

Big-leaf maple
Acer macrophyllum

California box elder
Acer negundo californica

White alder
Alnus rhombifolia

Fremont cottonwood
Populus fremontii

California black walnut
Juglans nigra

California sycamore
Platanus racemosa

SHRUBS

Toyon
Heteromeles arbutifolia

Pink winter currant
Ribes sanguineum

California rose
Rosa californica

TABLE 2
Sycamore-Oak Woodland Association—Proposed Species List

TREES

California buckeye
Aesculus californica

Coast live oak
Quercus agrifolia

Valley oak
Quercus lobata

California sycamore
Platanus racemosa

Blue elderberry
Sambucus mexicana

California bay
Umbellularia californica

SHRUBS

Coyote brush
Baccharis pilularis consanguinea

Dwarf coyote brush
Baccharis pilularis

Concha ceanothus
Ceanothus 'Concha'

Blue blossom
Ceanothus thrysiflorus

Pacific wax myrtle
Myrica californica

Holly-leaved cherry
Prunus ilicifolia

California rose
Rosa californica

Coffeeberry
Rhamnus californica

Common snowberry
Symphoricarpus albus

The planting basins will be maintained weed-free for a period of 3 years or until the plants are no longer susceptible to aggressive competition from weeds. Irrigation will be maintained for 3 years or such a time as the plants no longer need supplemental water. Use of pesticides will be undertaken only if necessary to prevent death or significant decline of plants; application will be consistent with surrounding land uses and water bodies.

MONITORING PLAN

Annual monitoring will begin 1 year after installation of the plants and will be conducted every August or September for 5 years. The monitoring plan described here will be refined upon continued consultation with the California Department of Fish and Game.

Percent cover of native riparian vegetation will be measured by species using the line intercept method. Random transects will be permanently established across the gabion boxes, the slope at the top of the gabions, and flat areas above the top-of-bank.

Diversity and growth will be measured during the annual random sampling. The number of species in gabion, slope and top-of-bank areas will be counted to determine diversity. Dominant plant species and the frequency of occurrence of litter or bare ground will be reported separately for the gabion, slope, and top-of-bank areas. Canopy width and height, and trunk diameter will be measured for woody vegetation. Relative cover and height will be measured for herbaceous vegetation.

The health of vegetation will be observed during random sampling, including the presence of dead, diseased, stunted, and browsed vegetation. These factors will be evaluated to determine if they are resulting in a lower survival rate than specified in the performance standards.

Reproduction and recruitment will also be observed during random sampling. The presence of seed or fruiting structures on plants will be noted. Estimates will be made of the contribution of sexual or asexual reproduction to the amount of new plants which volunteer in the mitigation area.

For the first 3 years, an exact count will be taken of the survival of each riparian plant which was initially installed. The performance standard will be 80 percent survival at the end of each year. This success rate has been achieved by the District in similar revegetation projects on Alamitos and Saratoga Creeks.

If survival of the initially installed plants falls below 80 percent in any one year, replacement plants of the same species will be installed in the following year. Observations of cover, growth, health and the presence of invasive plants may indicate the need for amendment of soils, continued or modified irrigation, or weed eradication.

Annual reports will be submitted by October 15 of each year to the California Department of Fish and Game. Each annual report will discuss methods and results for the survey conducted that year, and will make recommendations for any necessary actions in the following year(s). After the agency reviews the annual report and consults with the District, mitigation plantings will be adjusted, if necessary.

APPENDIX S-III

BIOLOGICAL BASELINE REPORTS— WETLANDS DETERMINATION (Reaches 9-12) AND HEP ANALYSIS (Reaches 1-8)

CALABAZAS CREEK
Preliminary Wetlands Determination

The Habitat Restoration Group

JOHN STANLEY & ASSOCIATES, INC.
6001 Butler Lane • Scotts Valley, CA 95066 • (408) 439-5500 • FAX (408) 438-1142
Branch Office • 216 F Street • Davis, CA 95616 • (916) 753-3905

The Habitat Restoration Group

JOHN STANLEY & ASSOCIATES, INC.

CALABAZAS CREEK
PRELIMINARY WETLANDS DETERMINATION

Prepared by

THE HABITAT RESTORATION GROUP
John Stanley & Associates, Inc.

John Gilchrist, Principal
Kathleen Lyons, Project Manager
Mara Noelle, Botanist

Prepared for

SANTA CLARA VALLEY WATER DISTRICT

February 11, 1991 S-186 File No. 387-04

6001 Butler Lane, Suite 1 • Scotts Valley, CA 95066 • (408) 439-5500 • FAX (408) 438-1142 • Branch Office • 216 F Street No. 63 • Davis, CA 95616 • (916) 753-3905

California Landscape Contractors License # 571037

CALABAZAS CREEK PRELIMINARY WETLANDS DETERMINATION

INTRODUCTION

A survey was performed from April to June, 1990 to determine the extent of wetland habitat along a section of Calabazas Creek (Highway 101 to the Guadalupe Slough; Reaches 9 - 12) in Santa Clara County, California. The preliminary wetland delineation was performed to comply with Section 404 of the Clean Water Act permit processing procedures. The proposed project includes the construction of maintenance roads along the 8' elevation of the existing levees on the east and west banks in Reaches 9 - 11. A maintenance road is proposed for the east bank within the floodplain of Reach 12. Ramps will be constructed throughout the study area, yet are predominately located at the conjunction of road crossings. Three areas of concrete lined channel are proposed from Tasman Avenue to Highway 237. In Reaches 9 - 11 (between Tasman Avenue and the Guadalupe Slough), the wetland delineation concentrated on the area of the levee slope between the 8' elevation and the mean high water mark.

METHODS

The wetland determination utilized the three parameter system outlined in the Federal Manual for Identifying and Delineating Wetlands (Federal Interagency Committee for Wetland Delineation, 1989). The presence of wetland vegetation, hydric soils, and wetland hydrology were analyzed to distinguish the wetlands from adjacent upland community. Native plant communities were determined as per the Preliminary Descriptions of the Terrestrial Natural Communities of California (Holland, 1986). The plant communities are delineated on the SCVWD project maps, scale 1' = 50', (Figures 1 - 4). Data forms for the wetlands determination are included in Appendix B.

A California Flora and Supplement (Munz and Keck, 1973) was utilized to identify vascular plant species. A list of plant species observed and their wetland indicator status is found in Appendix A. The wetland indicator status is per the National List of Plant Species that Occur in Wetlands: California (Region O), (Reed, 1988).

Acreage values were calculated by the SCVWD based on the plant community maps.

EXISTING CONDITIONS

The plant communities observed on the project site are coastal brackish marsh, willow riparian, and ruderal/upland. In Reach 9, upstream of the confluence of Calabazas Creek and Guadalupe Slough, the coastal brackish marsh intermixes with vegetation characteristic of a northern coastal salt marsh. In Reach 12, near Highway 101, the coastal brackish marsh intermixes with vegetation characteristic of a freshwater marsh.

The coastal brackish marsh and the willow riparian qualify as wetland communities based on the Army Corps of Engineers (COE) criteria. The ruderal/upland community does not qualify as a wetland. The criteria for each plant community is outlined in Table 1. Vegetation transects were performed in areas where the vegetation contained both upland and hydrophytic vegetation to confirm dominance, and therefore, determine whether the area qualifies as a wetland. Four transects were performed in Reaches 9-11; 8 transects were performed in Reach 12. If an area contains more than 50% of obligate, facultative wetland, or facultative plant species, or a prevalence index value of less than 3.0, then the area is dominated by hydrophytic vegetation, and meets the COE criteria. A prevalence index of 3.0 may indicate a wetland if the hydrologic features are present.

A total of approximately 19.3 acres of wetland vegetation occurs within the project site. Approximately 19.0 acres of wetland vegetation occur on Calabazas Creek and approximately 0.3 acres occur on San Tomas Aquino Creek. Calabazas Creek has approximately 11.5 acres of upland vegetation and San Tomas Aquino Creek has approximately 0.2 acres.

Coastal Brackish Marsh

Approximately 15.8 acres of coastal brackish marsh was observed along the borders of Calabazas Creek throughout the study area (Reaches 9 - 12).

In Reaches 9 - 11, the dominant emergent vegetation consists of common tule (*Scirpus acutus*), cattail (*Typha domingensis*), and Olney's bulrush (*Scirpus americanus*). The dominant plant species that experience periodic tidal inundation, and occur between the emergent and upland vegetation are peppergrass (*Lepidium latifolium*), bird's-foot trefoil (*Lotus corniculatus*), curly dock (*Rumex crispus*), and fat-hen (*Atriplex patula* ssp. *hastata*). In Reach 9, the aforementioned plant species intermix with brassbuttons (*Cotula coronopifolia*), pickleweed (*Salicornia subterminalis*), and jaumea (*Jaumea carnosa*).

The west bank of Reach 11 had recently been cleared of all vegetation by the SCVWD for flood control maintenance. At the time of the survey, wetland vegetation had begun to inhabit the area at the mean water line and below. Approximately 7.9 acres of coastal brackish marsh were observed in Reaches 9 - 11.

The dominant emergent vegetation in Reach 12 is California bulrush (*Scirpus californicus*), cattail, smartweed (*Polygonum* sp.), and creeping water-primrose (*Ludwigia peploides* ssp. *glabrescens*). The floodplain on the east bank and the lower elevations of the west bank experience periodic inundation and are dominated by bird's-foot trefoil, perennial ryegrass (*Lolium perenne*), horsetail (*Equisetum arvense*), Bermuda grass (*Cynodon dactylon*), broad leaf plantain (*Plantago major*) and cattail.

Reach 12 has a wide floodplain bordered by steep levees on the east bank. The west bank has steep levee banks that are nearly vertical at the edge of the creek, thus limiting the distribution of coastal brackish marsh vegetation. Reach 12 has 7.9 acres of coastal brackish marsh vegetation.

Along San Tomas Aquino Creek, approximately 0.3 acres of coastal brackish marsh were observed within the study area. The marsh forms a distinct band of vegetation at the base of the levee. The edges of the slough are dominated by California bulrush with patches of Olney's bulrush and cattail. A dense stand of peppergrass occurs between the California bulrush and the base of the levee.

Ruderal/Upland

The ruderal/upland plant community occurs on the upper slopes of the levees throughout the project site. In Reaches 9 - 11, the dominant plant species include Italian thistle (*Carduus pycnocephalus*), bristly ox-tongue (*Picris echioides*), ripgut brome (*Bromus diandrus*), wild oat (*Avena barbata*), mallow (*Malva parviflora*), ricegrass (*Oryzopsis miliacea*), and foxtail fescue (*Vulpia megalura*).

In Reaches 9 - 11, approximately 6.2 acres of this community was observed.

In Reach 12, the dominant vegetation on the slopes of the levee include Italian thistle, milk thistle (*Silybum marianum*), coyote brush (*Baccharis pilularis* ssp. *consanguinea*) and ripgut brome. The dominant upland species within the floodplain include woolly vetch (*Vicia villosa*), alfalfa (*Medicago sativa*), ripgut brome, rescue grass (*Bromus willdenowii*), wild oat, ricegrass, wild radish (*Raphanus sativa*), and fennel (*Foeniculum vulgare*). Approximately 5.3 acres of ruderal/upland vegetation were observed in Reach 12.

San Tomas Aquino Creek contains approximately 0.2 acres of the ruderal/upland community. Much of this community is bare ground. The levee bank had been recently mowed approximately 20' downslope from the top, thus destroying some of the pre-existing vegetation.

Willow Riparian

In Reaches 9 - 11, the willow riparian community occurs upon an island located north of Tasman Avenue, encompassing approximately 0.9 acres. Dominant plant species include yellow willow (*Salix lasiandra*), arroyo willow (*Salix lasiolepis*), and sandbar willow (*Salix sessilifolia*).

Reach 12 contains approximately 2.3 acres of willow riparian forest on the east bank, adjacent to the creek channel. The dominant plant species are red willow (*Salix leavigata*), yellow willow, sandbar willow, Fremont's cottonwood (*Populus fremontii*), white alder (*Alnus rhombifolia*), and horsetail.

Aquatic Habitat

Aquatic habitat consists of areas of permanent and/or intermittent inundation which may have submerged, free-floating or attached floating vegetation. Aquatic areas are devoid of emergent vegetation. The aquatic habitat of Calabazas Creek is considered a "water of the U.S." and is under jurisdiction of the COE, Section 10 of the Rivers and Harbors Act. Approximately 3.5 acres of aquatic habitat occur along Calabazas Creek.

Soil Analysis

Soil analyses were conducted throughout the project site. The location of soil samples are shown on project maps (Figure 1-5).

The soils in Reaches 9 - 11 predominately consist of Alviso clay, although Sunnyvale silty clay does exist in the area between Old Mountain View Road and Highway 237 and along a small portion of the creek north of Highway 237. Both soil types are listed as hydric soils by the United States Soil Conservation Service (SCS). The soils exhibit a low chroma matrix when analyzed with the Munsell Soil Color Charts (Kollmorgen, 1988). The soil colors taken from areas with hydrophytic vegetation and wetland hydrology range from black to dark grayish brown, and have very little mottling (Munsell notations of 2.5Y 2/0; 2.5Y 4/2; and 7.5YR N2/). Based on the observed characteristics, the soil is determined to be hydric.

The soil in the ruderal/upland area is considered hydric as per the SCS listing and has a low chroma value, yet characteristic mottling was present in only one of the soil samples. The soil sample taken in an area south of Old Mountain View Road at the edge of the mean water mark qualified as a hydric soil (Munsell notation 2.5Y 4/2). The soil sample taken north of Highway 237 did not have field indicators such as mottling, although the SCS listing is hydric and the chroma value is low (Munsell notation 2.5Y 5/2).

In Reach 12, the soil types are listed as hydric soils and include Alviso clay, Castro clay and Sunnyvale silty clay, drained. Two areas of the floodplain that did not qualify as wetlands have sandy soil that lack field indicators for hydric soils, yet the chroma values were low. Based on the hydric soils list and the low chroma value (Munsell notations for these samples were 2.5Y 3/2 and 5Y 6/2) these soils are considered hydric. One soil sample extracted from a wetland area had field indicators as well as low chroma value (Munsell notation of 2.5Y 3/2). A sample taken on the east bank near Highway 101 within the coastal brackish marsh had a variety of field indicators for hydric soils, but the chroma value was above 2 (the Munsell notation was 2.5Y 4/4). Although this soil composition is sandy, it is considered hydric based on the SCS classification of hydric soils and the presence of characteristic field indicators.

Hydrology

Due to the tidal regime within this portion of Calabazas Creek, the areas of periodic inundation were readily observed during the field surveys. Hydrological features observed included soil saturation, inundation, water marks, drift lines, deposition of sediment deposits, and morphological plant adaptations. During the time of the survey, large portions of the floodplain between Tasman Avenue and Highway 101 were inundated as a result of a rainstorm. The coastal brackish marsh and willow riparian qualify as areas with wetland hydrology based on COE criteria. The ruderal/upland community exhibits no indicating features of wetland hydrology.

Table 1. Criteria for Wetlands Determination

Plant Community	Hydric Vegetation	Hydric Soils	Wetland Hydrology
Brackish Marsh	yes	yes	yes
Willow Riparian Forest	yes	yes	yes
Ruderal/Upland	no	yes	no

Impacts

The proposed project would eliminate approximately 4.89 acres of coastal brackish marsh habitat and approximately 0.06 acres of the willow riparian community by the construction of maintenance roads and access ramps along the levee slopes. Approximately 2.4 acres of the ruderal/upland community would also be impacted (Table 2).

Table 2. Acres of Vegetation to be Impacted

Plant Community	Reach 9	Reach 10	Reach 11	Reach 12
Brackish Marsh	1.35	0.33	1.51	1.70
Ruderal/Upland	0.50	0.25	1.07	0.58
Willow Riparian	0.00	0.00	0.06	0.00

CALABAZAS CREEK PRELIMINARY WETLANDS DETERMINATION ADDENDUM

INTRODUCTION

An alternative design for the Calabazas Creek Flood Control Project was reviewed in February, 1991. The new plan was designed to reduce significant impacts to wetland vegetation through the elimination of depressed maintenance roads in Reaches 9 and 12, and the reduction of the extent of concrete lined channel under bridges in Reaches 9 - 12. A wetland mitigation area in Reach 9 has also been proposed to compensate for wetlands that would be eliminated.

Acreage values were calculated by the SCVWD based on the Habitat Restoration Group's plant community maps.

RESULTS

This proposed alternative project will permanently eliminate approximately 1.7 acres of coastal brackish marsh vegetation and 0.06 willow riparian vegetation. The new alternative reduces the impacts to approximately 3.2 acres of coastal brackish marsh vegetation. Impacts to the willow riparian vegetation are unchanged.

The redesign includes a wetland mitigation area on the east bank of Reach 9. This mitigation area will compensate for the removal of the 1.7 acres of coastal brackish marsh community at a ratio of 1:1.

The proposed plan does not mitigate for the loss of 0.06 acres of the willow riparian community.

Temporary construction impacts to approximately 2.4 acres of wetland and aquatic habitat and 0.09 acres of willow riparian habitat will occur during the reconstruction of the low flow channel. Aquatic habitat will be restored through the formation of the new channel and hydrologic regime. The areas which will be graded to form the sloped banks of the new low flow channel will be allowed to naturally revegetate with coastal brackish marsh and riparian vegetation. Following project completion, areas along these newly formed banks which are not regularly inundated will be revegetated by the SCVWD with native plant species adapted to the hydrologic regime of the site to prevent the introduction of invasive non-native plant species, as determined by a qualified revegetation specialist.

Approximately 4.76 acres of ruderal/upland vegetation will be impacted by the proposed project. This is not a significant impact, however, these graded areas will be revegetated with herbaceous native upland plant species to prevent the reintroduction of invasive non-native plant species. Upland habitat which is adjacent to wetlands provides nesting and roosting habitat for wildlife, increasing the value of the restored wetlands.

Table 3. Acres of Vegetation to be Permanently Impacted
1991 Project Alternative

Plant Community	Reach 9	Reach 10	Reach 11	Reach 12
Brackish Marsh	0.06	0.17	1.47	0.00
Ruderal/Upland	1.94	0.25	1.07	1.50
Willow Riparian	0.00	0.00	0.06	0.00

LITERATURE CITED

Federal Interagency Committee for Wetland Delineation, 1989. Federal Manual for Identifying and Delineating Jurisdictional Wetlands.

Holland, Robert. 1986 Terrestrial Plant Communities of California. California Department of Fish and Game. Sacramento, CA.

Munz, P. and D. Keck, 1968. A California Flora and Supplement. University of California Press. Berkeley, CA.

Reed, Porter B., Jr. 1988. National List of Plant Species That Occur in Wetlands: California (Region O). U.S. Fish and Wildlife Service.

APPENDIX A

CHECKLIST OF VASCULAR PLANTS

CALABAZAS CREEK

APPENDIX A

CHECKLIST OF VASCULAR PLANTS - CALABAZAS CREEK

SPECIES	COMMON NAME	STATUS
*** APIACEAE (UMBELLIFERAE)**		
Apium graveolens	Celery	FACW
Conium maculatum	Poison Hemlock	UPL
Foeniculum vulgare	Sweet Fennel	FACU
*** ASTERACEAE**		
Artemisia douglasiana	California Mugwort	FACW
Baccharis pilularis ssp. *consanguinea*	Coyote Brush	UPL
Carduus pycnocephalus	Italian Thistle	UPL
Centaurea solstitialis	Yellow Star Thistle	UPL
Cirsium vulgare	Common Thistle	UPL
Cotula coronopifolia	Brassbuttons	FACW
Heterotheca oregona	Golden Aster	UPL
Jaumea carnosa	Fleshy Jaumea	OBL
Lactuca serriola	Prickly Lettuce	UPL
Picris echioides	Bristly Ox-tongue	UPL
Silybum marianum	Milk Thistle	UPL
Sonchus asper	Prickly Sow Thistle	UPL
Xanthium strumarium	Cocklebur	FAC
*** BETULACEAE**		
Alnus rhombifolia	White Alder	FACW
*** BRASSICACEAE**		
Brassica nigra	Black Mustard	UPL
Cardaria draba	Hoary Cress	UPL
Lepidium latifolium	Perennial Peppergrass	FACW
Raphanus sativus	Wild Radish	UPL
*** CAPRIFOLIACEAE**		
Sambucus mexicana	Blue Elderberry	FAC
*** CHENOPODIACEAE**		
Atriplex patula var. *hastata*	Fat Hen	FACW
Atriplex semibaccata	Australian Saltbush	FAC
Beta vulgaris	Swiss Chard	FACU

SPECIES	COMMON NAME	STATUS
* **CHENOPODIACEAE** (Cont'd.)		
Salicornia subterminalis	Pickleweed	OBL
Salsola kali var. *tenuifolia*	Tumbleweed	FACU
* **CONVOLVULACEAE**		
Convolvulus arvensis	Bindweed	UPL
* **CYPERACEAE**		
Scirpus acutus	Common Tule	OBL
Scirpus americanus	Olney's Bulrush	OBL
Scirpus californicus	California Bulrush	OBL
Scirpus fluviatilis	River Bulrush	OBL
* **EQUISETACEAE**		
Equisetum arvense	Common Horsetail	FAC
* **EUPHORBIACEAE**		
Ricinus communis	Castor Bean	FACU
* **FABACEAE**		
Lotus corniculatus	Bird's-foot Trefoil	FAC
Medicago polymorpha	Bur Clover	UPL
Medicago sativa	Alfalfa	UPL
Melilotus indica	Yellow Sweet Clover	FAC
Vicia villosa	Woolly Vetch	UPL
* **FRANKENIACEAE**		
Frankenia grandifolia	Frankenia	FACW
* **FUMARIACEAE**		
Fumaria parviflora	Small-flowered Fumitory	–
* **GERANIACEAE**		
Geranium dissectum	Cut-leaved Geranium	UPL
* **JUGLANDACEAE**		
Juglans hindsii	Black Walnut	FAC
* **LAMINACEAE**		
Mentha arvensis var. *lanatum*	Field Mint	FACW

SPECIES	COMMON NAME	STATUS
* **MALVACEAE**		
Malva neglecta	Mallow	UPL
Malva parviflora	Mallow	UPL
* **ONOGRACEAE**		
Ludwigia peploides ssp. *glabrescens*	Creeping Water-primrose	OBL
* **PAPAVERACEAE**		
Eschscholzia californica	California Poppy	UPL
* **PLANTAGINACEAE**		
Plantago lanceolata	English Plantain	FAC
Plantago major	Broad Leaf Plantain	FACW
* **POACEAE (GRAMINEAE)**		
Arundo donax	Giant Reed	FACW
Avena barbata	Wild Oat	UPL
Bromus diandrus	Ripgut Grass	UPL
Bromus mollis	Soft Chess	UPL
Bromus rubens	Red Brome	UPL
Bromus willdenowii	Prairie Brome	UPL
Cynodon dactylon	Burmuda Grass	FAC
Elymus triticoides	Alkali Rye Grass	FAC
Holcus lanatus	Velvet Grass	FAC
Hordeum leporinum	Farmer's Foxtail	UPL
Lolium perenne	Italian Ryegrass	FAC
Oryzopsis miliaceae	Ricegrass	UPL
Phalaris tuberosa var. *stenoptera*	Canary Grass	FACU
Poa annua	Annual Bluegrass	UPL
Polypogon monspeliensis	Rabbitsfoot Grass	FACW
Vulpia megalura	Rattail Fescue	UPL
* **POLYGONACEAE**		
Rumex conglomeratus	Green Dock	FACW
Rumex crispus	Curly Dock	FACW
* **ROSACEAE**		
Rubus procerus	Himalaya Berry	UPL
* **SALICACEAE**		
Populus fremontii	Fremont Cottonwood	FACW
Salix babylonica	Weeping Willow	FACW

SPECIES	COMMON NAME	STATUS
Salix laevigata	Red Willow	—
Salix lasiandra	Yellow Willow	OBL
Salix lasiolepis	Arroyo Willow	FACW
Salix sessilifolia	Sandbar Willow	FACW
* **SOLANACEAE**		
Nicotiana glauca	Tree Tobacco	FAC
* **TYPHACEAE**		
Typha domingensis	Cat-tail	OBL

APPENDIX B

DATA FORMS FOR WETLANDS DETERMINATION

CALABAZAS CREEK

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): MN EB Date: April 12
Project/Site: Calabazas Creek State: CA County: Santa Clara
Applicant/Owner: SCVWD Plant Community #/Name: Brackish marsh
Note: If a more detailed site description is necessary, use the back of data form or a field notebook. South of old Mountain

Do normal environmental conditions exist at the plant community?
Yes ✓ No (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes No ✓ (If yes, explain on back)

10' south of old Mountain View - Alviso Rd - East Bank
Station #s 20-00 to 20-00

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Scirpus acutus	OBL		11.			
2.	Typha domingensis	OBL		12.			
3.	Lotus corniculatus	FAC		13.			
4.	Lepidium latifolium	FAC		14.			
5.	[illegible]	Fac		15.			
6.				16.			
7.				17.			
8.				18.			
9.				19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 100%
Is the hydrophytic vegetation criterion met? Yes ✓ No
Rationale: dominance of hydrophytic vegetation

SOILS

Series/phase: Alviso Clay Subgroup:[2] 7.5YR 2/0
Is the soil on the hydric soils list? Yes ✓ No Undetermined
Is the soil a Histosol? Yes No ✓ Histic epipedon present? Yes No ✓
Is the soil: Mottled? Yes No ✓ Gleyed? Yes No
Matrix Color: black Mottle Colors:
Other hydric soil indicators: saturated soil
Is the hydric soil criterion met? Yes ✓ No
Rationale: the soil is on the hydric soils list. the Munsell notation indicates a soil with hydric features

HYDROLOGY

Is the ground surface inundated? Yes ✓ No Surface water depth:
Is the soil saturated? Yes ✓ No
Depth to free-standing water in pit/soil probe hole: —
List other field evidence of surface inundation or soil saturation.
the ground is periodically inundated, continually saturated
Is the wetland hydrology criterion met? Yes ✓ No
Rationale:

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ✓ No
Rationale for jurisdictional decision: The three [illegible] met.

---

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.

[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): MW EC Date: 5-2-90
Project/Site: Calabazas Creek State: CA County: Santa Clara
Applicant/Owner: SCVWD Plant Community #/Name: Upland
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

North of Highway 237 - west bank
Between Station # 20-00 and 10-0
Transect C

Do normal environmental conditions exist at the plant community?
Yes ✓ No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ✓ No ____ (If yes, explain on back)

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Carduus	UP	Herb	11.		
2. [illegible]	UP	he.	12.		
3. Lepidium latifolium	FACW	herb	13.		
4. [illegible]	UP	her.	14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 30%
Is the hydrophytic vegetation criterion met? Yes ____ No ✓
Rationale: the area is not dominated by wetland vegetation

SOILS

Series/phase: Alviso Clay Subgroup:[2] 2.5Y 5/2
Is the soil on the hydric soils list? Yes ✓ No ____ Undetermined ____
Is the soil a Histosol? Yes ____ No ✓ Histic epipedon present? Yes ____ No ✓
Is the soil: Mottled? Yes ____ No ✓ Gleyed? Yes ____ No ✓
Matrix Color: grayish brown Mottle Colors:
Other hydric soil indicators:
Is the hydric soil criterion met? Yes ____ No ✓
Rationale:

HYDROLOGY

Is the ground surface inundated? Yes ____ No ✓ Surface water depth:
Is the soil saturated? Yes ____ No ✓
Depth to free-standing water in pit/soil probe hole:
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes ____ No ✓
Rationale: No hydrology present

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ____ No ✓
Rationale for jurisdictional decision: The vegetation is not hydrophytic, and there is no wetland hydrology. The soil is on the hydric soils list, but does not have additional hydric characteristics.

---

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): CM EP
Date: 5-2-98
Project/Site: Calabazas Creek 237 → Slough
State: CA
County: Santa Clara
Applicant/Owner: SCVWD
Plant Community #/Name: Brackish Marsh

Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes ✓ No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No ✓ (If yes, explain on back)

North of Hiway 237 - west Bank
Between Station#'s 20-00 and 10-00
Transect C

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Scirpus [illegible]	OBL		11.		
2. Lepidium latifolium	fac		12.		
3. Typha [illegible]	OBL		13.		
4. [illegible]	OBL		14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 100%
Is the hydrophytic vegetation criterion met? Yes ✓ No ____
Rationale: 100% dominance

SOILS

Series/phase: Alviso Clay
Subgroup:[2] 2.5Y 4/2
Is the soil on the hydric soils list? Yes ✓ No ____ Undetermined ____
Is the soil a Histosol? Yes ____ No ✓ Histic epipedon present? Yes ____ No ✓
Is the soil: Mottled? Yes ✓ No ____ Gleyed? Yes ____ No ✓
Matrix Color: dark grayish brown
Mottle Colors: black, orange, dark brown, white
Other hydric soil indicators: Iron concretions
Is the hydric soil criterion met? Yes ✓ No ____
Rationale:

HYDROLOGY

Is the ground surface inundated? Yes ____ No ✓ Surface water depth:
Is the soil saturated? Yes ✓ No ____
Depth to free-standing water in pit/soil probe hole: —
List other field evidence of surface inundation or soil saturation.
[illegible] tidal inundation
Is the wetland hydrology criterion met? Yes ✓ No ____
Rationale: Soil is saturated at all times [illegible]
[illegible]

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ✓ No ____
Rationale for jurisdictional decision:

---

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.

[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): MN ED
Project/Site: Calabasas creek, 237→Slough; EB State: CA
Date: 5-3-90
County: Santa Clara
Applicant/Owner: SCVWD
Plant Community #/Name: Brackish Marsh

Note: If a more detailed site description is necessary, use the back of data form or a field notebook. Transect D

Do normal environmental conditions exist at the plant community?
Yes ✓ No ___ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ___ No ✓ (If yes, explain on back)

Transect D
located between Highway 237 and
the Guadalupe Slough
between station # 00-00 and 10-00

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Lepidium latifolium	FacW	Herb	11.			
2.	Cotula coronopifolia	FacW	Herb	12.			
3.	Jaumea carnosa	OBL	Herb	13.			
4.	Atriplex patula	FacW	Herb	14.			
5.	var. hastata			15.			
6.				16.			
7.				17.			
8.				18.			
9.				19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 100%
Is the hydrophytic vegetation criterion met? Yes ✓ No ___
Rationale: The vegetation is dominated by FacW and OBL species.

SOILS

Series/phase: Alviso Clay Subgroup:[2] 2.5Y 2/0
Is the soil on the hydric soils list? Yes ✓ No ___ Undetermined ___
Is the soil a Histosol? Yes ___ No ✓ Histic epipedon present? Yes ___ No ✓
Is the soil: Mottled? Yes ✓ No ___ Gleyed? Yes ___ No ✓
Matrix Color: black Mottle Colors: grey
Other hydric soil indicators: ___
Is the hydric soil criterion met? Yes ✓ No ___
Rationale: The soil is on the hydric soils list, and the color/Munsell notation is indicative of a hydric soil.

HYDROLOGY

Is the ground surface inundated? Yes ___ No ✓ Surface water depth: ___
Is the soil saturated? Yes ___ No ✓
Depth to free-standing water in pit/soil probe hole: ___
List other field evidence of surface inundation or soil saturation.
evidence of water line at the high tide point; periodic inundation
Is the wetland hydrology criterion met? Yes ✓ No ___
Rationale: evidence of periodic ~~of~~ inundation and saturated soil.

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ✓ No ___
Rationale for jurisdictional decision: based on evidence of soil, hydrology & vegetation

---

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.

[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): MN & EB Date: April 19
Project/Site: [illegible] Creek State: CA County: Santa Clara
Applicant/Owner: SCVWD Plant Community #/Name: Ruderal
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
[✓ Yes] No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ [✓ No] (If yes, explain on back)

North of Highway 237 - East Bank
Station #s 10-00 to 20-00

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Avena	UPL		11.		
2. Picris	FAC		12.		
3. Bromus diandrus	UPL		13.		
4. Conium	UPL		14.		
5. Carduus	UPL		15.		
6. Chrysopsis	UPL		16.		
7. mallow	UPL		17.		
8. Lolium	FAC		18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 13%
Is the hydrophytic vegetation criterion met? Yes ____ [✓ No]
Rationale: the vegetation is not hydrophytic

SOILS

Series/phase: Aliso Clay Subgroup:[2] 2.5Y 4/2
Is the soil on the hydric soils list? [✓ Yes] No ____ Undetermined ____
Is the soil a Histosol? Yes ____ [✓ No] Histic epipedon present? Yes ____ [✓ No]
Is the soil: Mottled? [✓ Yes] No ____ Gleyed? Yes ____ [✓ No]
Matrix Color: dark greyish brown Mottle Colors: Black, tan, grey, light brown, dark brown
Other hydric soil indicators: Non-decomposed plant material present [illegible] is unusual
Is the hydric soil criterion met? [✓ Yes] No ____
Rationale: the soil is on the hydric soils list, and the mottling is characteristic of a hydric soil

HYDROLOGY

Is the ground surface inundated? [✓ Yes] No ____ Surface water depth: ____
Is the soil saturated? [✓ Yes] No ____
Depth to free-standing water in pit/soil probe hole: ____
List other field evidence of surface inundation or soil saturation.
water marks on vegetation
Is the wetland hydrology criterion met? [✓ Yes] No ____
Rationale: the area is periodically inundated and the soil saturated

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ____ No ____
Rationale for jurisdictional decision: ____

---

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): M. Noelle
Project/Site: Calabazas Creek Transect 1 State: CA
Date: [illegible]
County: Santa Clara
Applicant/Owner: SCVWD Plant Community #/Name: Brackish marsh
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes ✓ No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No ✓ (If yes, explain on back)

South of Tasman - East Bank
Between Station #5
50-00 and 60-00

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Lotus	Fac		11.		
2. Sedge			12.		
3. Cotula			13.		
4. Lolium	Fac		14.		
5. Typha	OBL		15.		
6. Scirpus californicus	OBL		16.		
7. Plantago major	Facw		17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 100%
Is the hydrophytic vegetation criterion met? Yes ✓ No ____
Rationale: Dominance of hydrophytic vegetation

SOILS

Series/phase: Alviso Clay Subgroup:[2] 2.5Y 3/2
Is the soil on the hydric soils list? Yes ✓ No ____ Undetermined ____
Is the soil a Histosol? Yes ____ No ✓ Histic epipedon present? Yes ____ No ✓
Is the soil: Mottled? Yes ✓ No ____ Gleyed? Yes ____ No ✓
Matrix Color: very dark grayish brown Mottle Colors: black
Other hydric soil indicators: manganese concretions
Is the hydric soil criterion met? Yes ✓ No ____
Rationale: hydric soil & hydric soil indicators, [illegible]

HYDROLOGY

Is the ground surface inundated? Yes ____ No ✓ Surface water depth: ____
Is the soil saturated? Yes ✓ No ____
Depth to free-standing water in pit/soil probe hole: ____
List other field evidence of surface inundation or soil saturation.
drift lines, water borne sediment deposits, water stained leaves
Is the wetland hydrology criterion met? Yes ✓ No ____
Rationale: Saturated soil, drift lines, wetland drainage patterns

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ✓ No ____
Rationale for jurisdictional decision: The three wetland criteria have been satisfied

---

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.

[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): M. Nuillo E. Balcar Date: 5-21-90
Project/Site: Calabazas Creek - Transect 2 State: CA County: Santa Clara
Applicant/Owner: SCVWD Plant Community #/Name: Ruderal/upland
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Tasmas to 101 - East Bank
Station # 60-00

Do normal environmental conditions exist at the plant community?
Yes ✓ No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No ✓ (If yes, explain on back)

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Vicia villosa	UPL		11.			
2.	Equisetum arvense	Fac		12.			
3.	Medicago sativa	UPL		13.			
4.	Bromus willdenowii	UPL		14.			
5.				15.			
6.				16.			
7.				17.			
8.				18.			
9.				19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 35%
Is the hydrophytic vegetation criterion met? Yes ____ No ✓
Rationale: The prevalence index indicates that the vegetation is not hydrophytic.

SOILS

Series/phase: Alviso Clay Subgroup:[2] 2.5Y 3/2
Is the soil on the hydric soils list? Yes ✓ No ____ Undetermined ____
Is the soil a Histosol? Yes ____ No ✓ Histic epipedon present? Yes ____ No ✓
Is the soil: Mottled? Yes ____ No ✓ Gleyed? Yes ____ No ✓
Matrix Color: very dark grayish brown Mottle Colors: ____
Other hydric soil indicators: none
Is the hydric soil criterion met? Yes ✓ No ____
Rationale: The soil is listed as hydric and has a low chroma value. The sample was taken within the floodplain and was sandy therefore no soil indicators were present.

HYDROLOGY

Is the ground surface inundated? Yes ____ No ✓ Surface water depth: ____
Is the soil saturated? Yes ____ No ✓
Depth to free-standing water in pit/soil probe hole: ____
List other field evidence of surface inundation or soil saturation.
none
Is the wetland hydrology criterion met? Yes ____ No ✓
Rationale: ____

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ____ No ✓
Rationale for jurisdictional decision: Only one of the three criteria have has met

---

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): Noble, Ellen Baker
Project/Site: Calabazas Creek-Transect 6 State: CA Date: 5-21-90
Applicant/Owner: SCVWD County: Santa Clara
Plant Community #/Name: ruderal/upland
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes ✓ No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No ✓ (If yes, explain on back)

Tasman to Highway 101 - East Bank
Between Station #'s 60-00 and 70-00

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Lotus corniculatus	Fac		11.			
2.	Lolium Perenne	Fac		12.			
3.	Bromus Diandrus	UPL		13.			
4.	Avena barbata	UPL		14.			
5.				15.			
6.				16.			
7.				17.			
8.				18.			
9.				19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 50%
Is the hydrophytic vegetation criterion met? Yes ____ No ✓
Rationale: The prevalence index indicates that the vegetation is not hydrophytic.

SOILS

Series/phase: Castro Clay Subgroup:[2] 5Y 6/2
Is the soil on the hydric soils list? Yes ✓ No ____ Undetermined ____
Is the soil a Histosol? Yes ____ No ✓ Histic epipedon present? Yes ____ No ✓
Is the soil: Mottled? Yes ____ No ✓ Gleyed? Yes ____ No ✓
Matrix Color: light olive grey Mottle Colors: ____
Other hydric soil indicators: there is some grey clay present within the sandy soil
Is the hydric soil criterion met? Yes ✓ No ____
Rationale: The soil is on the hydric soil list and the chroma value is low. The soil was sandy floodplain materials therefore no soil indicators were present

HYDROLOGY

Is the ground surface inundated? Yes ____ No ✓ Surface water depth: ____
Is the soil saturated? Yes ____ No ✓
Depth to free-standing water in pit/soil probe hole: ____
List other field evidence of surface inundation or soil saturation.
drift line
Is the wetland hydrology criterion met? Yes ____ No ✓
Rationale: ____

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ____ No ✓
Rationale for jurisdictional decision: Although the soil is considered hydric, the 2 other parameters have not been met.

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): M. [illegible] Ellen Baker
Project/Site: Calabazas Creek Transect 7 **Date:** 5-31-90
Applicant/Owner: SCVWD **State:** ______ **County:** Santa Clara
Plant Community #/Name: brackish marsh

Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes ✓ No ______ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ______ No ✓ (If yes, explain on back)

North of Highway 101 - East Bank
Station #'s 100-00 to 90-00

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Lolium perenne	Fac	Herb	11.		
2.			12.		
3.			13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 95%
Is the hydrophytic vegetation criterion met? Yes ✓ No ______
Rationale: The area is dominated by Facultative vegetation.

SOILS

Series/phase: Sunnyvale silty clay Subgroup:[2] 2.5Y 4/4
Is the soil on the hydric soils list? Yes ✓ No ______ Undetermined ______
Is the soil a Histosol? Yes ______ No ✓ Histic epipedon present? Yes ______ No ✓
Is the soil: Mottled? Yes ✓ No ______ Gleyed? Yes ______ No ✓
Matrix Color: Olive brown Mottle Colors: orange, black, grey, red
Other hydric soil indicators: iron secretions, gleyed mottling, horizontal organic layers, saturation
Is the hydric soil criterion met? Yes ✓ No ______
Rationale: Although the chroma value is not low, the soil is on the hydric soil list and soil indicators were present

HYDROLOGY

Is the ground surface inundated? Yes ✓ No ______ Surface water depth: 1" - 1'
Is the soil saturated? Yes ✓ No ______
Depth to free-standing water in pit/soil probe hole: ______
List other field evidence of surface inundation or soil saturation.
drift lines, deposition of sediment deposits.
Is the wetland hydrology criterion met? Yes ✓ No ______
Rationale: observed inundation & strong evidence of hydrological features

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ✓ No ______
Rationale for jurisdictional decision: The three criteria have been met!

---

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): [illegible] Date: 8-7-9[illegible]
Project/Site: San Tomas Aquino Creek State: CA County: Santa Clara
Applicant/Owner: SCVWD Plant Community #/Name: Brackish Marsh
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes ____ No [✓] (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No [✓] (If yes, explain on back)

Transect 1
75 ft NE. of stake #1.
Between stations 0-00 and 10-00

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Lepidium latifolium	FacW	Herb	11.		
2. Scirpus acutus	Obl	Herb	12.		
3. Typha domingensis	Obl	Herb	13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 100%
Is the hydrophytic vegetation criterion met? Yes [✓] No ____
Rationale: Dominance of hydrophytic vegetation; prevalence index of 1.

SOILS

Series/phase: Alviso Clay Subgroup:[2] 2.5Y 4/2
Is the soil on the hydric soils list? Yes [✓] No ____ Undetermined ____
Is the soil a Histosol? Yes ____ No [✓] Histic epipedon present? Yes ____ No [✓]
Is the soil: Mottled? Yes [✓] No ____ Gleyed? Yes ____ No ____
Matrix Color: dark grayish brown Mottle Colors: orange, black, grey
Other hydric soil indicators: Peraquic moisture regime, iron & manganese concretions
Is the hydric soil criterion met? Yes [✓] No ____
Rationale: The soil is listed on the hydric soils list and has [illegible] of tidal influence, and has hydric soil indicators of mottling and [illegible].

HYDROLOGY

Is the ground surface inundated? Yes ____ No [✓] Surface water depth: ____
Is the soil saturated? Yes [✓] No ____
Depth to free-standing water in pit/soil probe hole: ____
List other field evidence of surface inundation or soil saturation.
inundation, saturation, water marks, waterborne mineral deposits, morphological adaptations
Is the wetland hydrology criterion met? Yes [✓] No ____
Rationale: Criteria is based on the saturated soil and evidence of tidal inundation.

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes [✓] No ____
Rationale for jurisdictional decision: The three parameters for wetlands have been met

---

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.

[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): Mara Noelle, Tamara Meyers
Date: 8-8-90
Project/Site: San Tomas Aquino Creek
State: CA
County: Santa clara
Applicant/Owner: SCVWD
Plant Community #/Name: Brackish marsh
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes ✓ No ___ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ___ No ✓ (If yes, explain on back)

Transect 2
275' SE of the first station
Between station # 0+00 and 10+00

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Lepidium latifolium	FacW	Herb	11.			
2.	Scirpus acutus	Obl	Herb	12.			
3.				13.			
4.				14.			
5.				15.			
6.				16.			
7.				17.			
8.				18.			
9.				19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 100%
Is the hydrophytic vegetation criterion met? Yes ✓ No ___
Rationale: Dominance of hydrophytic vegetation; prevalence index of 2.

SOILS

Series/phase: Alviso Clay
Subgroup:[2] 5Y 2.5/1
Is the soil on the hydric soils list? Yes ✓ No ___ Undetermined ___
Is the soil a Histosol? Yes ___ No ✓ Histic epipedon present? Yes ___ No ✓
Is the soil: Mottled? Yes ✓ No ___ Gleyed? Yes ___ No ✓
Matrix Color: Black
Mottle Colors: yellow/green and bright orange
Other hydric soil indicators: iron and manganese concretions, peraquic moisture regime
Is the hydric soil criterion met? Yes ✓ No ___
Rationale: low chroma value, listed hydric soils, peraquic moisture regime & slight mottling

HYDROLOGY

Is the ground surface inundated? Yes ___ No ✓ Surface water depth: ___
Is the soil saturated? Yes ✓ No ___
Depth to free-standing water in pit/soil probe hole: ___
List other field evidence of surface inundation or soil saturation.
Water marks and evidence of [illegible] tidal inundation
Is the wetland hydrology criterion met? Yes ✓ No ___
Rationale: The area has evidence of tidal inundation and the soil is saturated.

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ✓ No ___
Rationale for jurisdictional decision: The [illegible] wetlands have been met.

---

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

HEP ANALYSIS (Reaches 1-8)

SUSAN D. SANDERS, PH.D.
ENVIRONMENTAL CONSULTANT
133 NORTH STREET • WOODLAND, CALIFORNIA 95695
TELEPHONE (916) 662-2655

17 June 1987

Dr. Bernie Goldner
Santa Clara Valley Water District
5750 Almaden Expressway
SAn Jose, CA 95118

Dear Bernie:

Jeff requested that I revise the HEP analysis to reflect the altered plans for Calabazas creek. I have compiled the appropriate Annual Average Habitat Units (AAHUs) for each species on the attached sheet. Because I had already calculated AAHUs for Northern Orioles, Downy Woodpeckers, and Raccoons with retention of Reach 1B, I did not need to rerun those species. Yellow Warblers and Common Yellowthroats also did not need a new analysis. The only variables of interest (at least as far as the Habitat Suitability Index models are concerned) for these two species are instream vegetation. Jeff indicated that channel maintenance, and therefore instream vegetation, will be the same after the project as before, so the habitat values for Yellow Warbler and Common Yellowthroat will be the same for the no project and revised project alternatives.

As you can see from the AAHU values, the revegetation plan combined with retention of 1B and the minimal channel maintenance will more than compensate for lost habitat values over the 55 year life of the project.

The results of this HEP are consistent with my qualitative assessment of the likely changes in wildlife habitat values. Now that Reach 1B and the instream vegetation will be left largely intact, I think the revegetation scheme really will improve parts of the creek for many species. The chief unknown quantity, as you know better than anyone else, is whether or not the revegetation will have the expected results over the next five decades. This HEP assumes that the revegetation will be successful.

My major concerns about the wildlife impacts of this project are relieved by your revised plans for Reaches 1B, 3A, and instream maintenance. I hope the agencies will be similarly pleased by your efforts to accommodate wildlife habitat along the creek.

Please give me a call if you have any questions about this analysis, or would like revisions.

Sincerely,

Susan Sanders
Susan Sanders

cc: Anne Sands
Jeff Micko

SUSAN D. SANDERS, PH.D.
ENVIRONMENTAL CONSULTANT
133 NORTH STREET • WOODLAND, CALIFORNIA 95695
TELEPHONE (916) 662-2655

CALBAZAS CREEK REVISED HEP

	No Project	Revised Project
Yellow Warbler	4.5	4.5
Northern Oriole	3.0	6.04
Common Yellowthroat	7.5	7.5
Downy Woodpecker	7.5	7.95
Raccoon	7.5	7.51

Annual Average Habitat Units over the
55-year life of the project.

SUSAN D. SANDERS, PH.D.
ENVIRONMENTAL CONSULTANT
133 NORTH STREET • WOODLAND, CALIFORNIA 95695
TELEPHONE (916) 662-2655

[illegible] VALLEY [illegible] DISTRICT
87 APR 13 A10:43

4/13 BHG w/A
SNW
KPR
RRT

8 April 1987

Dr. Bernie Goldner
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Dear Bernie:

I have enclosed the HEP results for Calabazas Creek, and have summarized them on the next page in terms of Annual Average Habitat Units (AAHU). I have also annotated the output.

The revegetation proposed for the project will completely compensate for lost habitat value for the Downy Woodpecker and other bark-drillers. The proposed mitigation comes fairly close to compensating for Raccoon because the revegetation plan will ultimately produce well-developed undergrowth. The compensation is altogether complete if Reach 1B is retained.

Northern Orioles are more than compensated by the revegetation. Because the mitigation plan calls for establishing riparian trees where none now exist, the project will create new habitat for Northern Orioles. Because Northern Orioles prefer mature trees, we see don´t see this habitat enhancement occurring until year 35.

The losers in this analysis are wildlife requiring willows and instream vegetation. Under both project alternatives, Yellow Warblers and Common Yellowthroats lose habitat, although retention of Reach 1B and revegetation comes closest to mitigating for habitat loss. The Yellow Warbler requires willow shrubs, sapling cottonwoods, and other deciduous, hydrophytic young growth. As you know, the revegetation plan does not include many willows or other water-demanding plants, so the mitigation does relatively little toward enhancing Yellow Warber habitat.

The Common Yellowthroat requires instream, emergent vegetation, and lots of bramble and willow growth on the banks near the channel. I assumed that channel maintenance and clearing would occur on a regular basis with the project, so that there would be no appreciable woody growth or cattail stands along the creek or on the banks near the channel. If you think this assumption is incorrect and that there really will be sufficient cattails and willows in the channel, then I can re-run the analysis using new assumptions.

The HEP analysis shows that over the long run (i.e. 55 years) the mitigation plan comes very close to replacing lost habitat values for most species. The mitigation and maintenance plans do not, however, compensate for wildlife that require instream vegetation and young willow/cottonwood stands. I see no way of providing in-kind mitigation for this loss, short of altering the maintenance plans and allowing some growth within the creek channel.

As soon as you feel satisfied with the analysis and results, we should share this information with USFWS and CDF&G and get their reactions. As I note in the enclosed report of conversation forms, I told both Cay Goude and Carl Wilcox that I would get back to them regarding the HEP results once you had reviewed and approved them.

Please give me a call if you have questions about the analysis, or if you would like me to re-run any of the species using some different assumptions.

Sincerely,

Susan

Susan Sanders

cc: Anne Sands, Riparian Systems.

SUSAN D. SANDERS, PH.D.
ENVIRONMENTAL CONSULTANT
133 NORTH STREET • WOODLAND, CALIFORNIA 95695
TELEPHONE (916) 662-2655

CALABAZAS CREEK HEP ANALYSIS

	No Project	Project w/Revegetation	Reveg & 1B
Yellow Warbler	4.5	1.75	2.91
Northern Oriole	3.0	5.60	6.04
Common Yellowthroat	7.5	0.07	0.37
Downy Woodpecker	7.5	7.49	7.95
Raccoon	7.5	6.88	7.51

Annual Average Habitat Units (AAHU) over 55-year life of the project.

Habitat Suitablity Index (HSI) models: I used USFWS HSI models for the Downy Woodpecker and Yellow Warbler. Karen Miller (USFWS) provided me with a model for the Northern Oriole, and I relied on California Wildlife Habitat Relationships Species Notes and other references for life history information on the Common Yellowthroat and Raccoon.

Cover Types: I considered all plant communities along Calabazas Creek as a single cover type.

Assumptions: I used the same target years, predicted habitat changes, and most of the assumptions outlined for the Lower Coyote Creek HEP analysis (pp. 13 - 20). My assumptions and scenarios differ from those of the Coyote Creek analysis because I considered only one existing habitat type, and the only habitat type to be created is riparian. The revegetation plan used for predicting future changes along the Calabazas was based on the Saratoga Creek mitigation plan.

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 1 (without project) NO PROJECT
Period of Analysis: 55
Evaluation Species: 1 YELLOW WARBLER AAHU´s: 4.50

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	15.00	0.30	4.50
1	15.00	0.30	4.50
5	15.00	0.30	4.50
10	15.00	0.30	4.50
35	15.00	0.30	4.50
55	15.00	0.30	4.50

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 1 (without project) NO PROJECT
Period of Analysis: 55
Evaluation Species: 2 NORTHERN ORIOLE AAHU´s: 3.00

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	15.00	0.20	3.00
1	15.00	0.20	3.00
5	15.00	0.20	3.00
10	15.00	0.20	3.00
35	15.00	0.20	3.00
55	15.00	0.20	3.00

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 1 (without project) NO PROJECT
Period of Analysis: 55
Evaluation Species: 3 COMMON YELLOWTHROAT AAHU´s: 7.50

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	15.00	0.50	7.50
1	15.00	0.50	7.50
5	15.00	0.50	7.50
10	15.00	0.50	7.50
35	15.00	0.50	7.50
55	15.00	0.50	7.50

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 1 (without project) NO PROJECT
Period of Analysis: 55
Evaluation Species: 4 DOWNY WOODPECKER AAHU´s: 7.50

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	15.00	0.50	7.50
1	15.00	0.50	7.50
5	15.00	0.50	7.50
10	15.00	0.50	7.50
35	15.00	0.50	7.50

Form C: Average-Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 1 (without project) NO PROJECT
Period of Analysis: 55
Evaluation Species: 5 RACCOON AAHU´s: 7.50

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	15.00	0.50	7.50
1	15.00	0.50	7.50
5	15.00	0.50	7.50
10	15.00	0.50	7.50
35	15.00	0.50	7.50
55	15.00	0.50	7.50

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) PROJECT WITH REVEG
Period of Analysis: 55
Evaluation Species: 1 YELLOW WARBLER AAHU´s: 1.75

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	15.00	0.30	4.50
1	15.00	0.00	0.00
5	15.00	0.00	0.00
10	15.00	0.20	3.00
35	15.00	0.10	1.50
55	15.00	0.10	1.50

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) PROJECT WITH REVEG
Period of Analysis: 55
Evaluation Species: 2 NORTHERN ORIOLE AAHU´s: 5.60

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	15.00	0.20	3.00
1	15.00	0.00	0.00
5	15.00	0.06	0.90
10	15.00	0.26	3.90
35	15.00	0.50	7.50
55	15.00	0.50	7.50

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) PROJECT WITH REVEG
Period of Analysis: 55
Evaluation Species: 3 COMMON YELLOWTHROAT AAHU´s: 0.07

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	15.00	0.50	7.50
1	15.00	0.00	0.00
5	15.00	0.00	0.00
10	15.00	0.00	0.00
35	15.00	0.00	0.00

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) PROJECT WITH REVEG
Period of Analysis: 55
Evaluation Species: 4 DOWNY WOODPECKER AAHU´s: 7.49

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	15.00	0.50	7.50
1	15.00	0.10	1.50
5	15.00	0.10	1.50
10	15.00	0.20	3.00
35	15.00	0.60	9.00
55	15.00	1.00	15.00

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) PROJECT WITH REVEG
Period of Analysis: 55
Evaluation Species: 5 RACCOON AAHU´s: 6.88

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	15.00	0.50	7.50
1	15.00	0.14	2.10
5	15.00	0.14	2.10
10	15.00	0.30	4.50
35	15.00	0.60	9.00
55	15.00	0.60	9.00

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA ~~2~~4 (with project) 1B AND REVEG
Period of Analysis: 55
Evaluation Species: 1 YELLOW WARBLER AAHU´s: 2.91

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	15.00	0.30	4.50
1	15.00	0.09	1.35
5	15.00	0.09	1.35
10	15.00	0.27	4.05
35	15.00	0.18	2.70
55	15.00	0.18	2.70

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) 1B AND REVEG
Period of Analysis: 55
Evaluation Species: 2 NORTHERN ORIOLE AAHU´s: 6.04

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	15.00	0.20	3.00
1	15.00	0.12	1.80
5	15.00	0.11	1.65
10	15.00	0.29	4.35
35	15.00	0.52	7.80
55	15.00	0.52	7.80

COMMON YELLOWTHROAT

Form C: Average Annual Habitat Units Date: 04/07/1987
:Habitat 0.37

	of Habitat	Suitability Index	Units
0	15.00	0.50	7.50
1	15.00	0.02	0.30
5	15.00	0.02	0.30
10	15.00	0.02	0.30
35	15.00	0.02	0.30
55	15.00	0.02	0.30

Form C: Average Annual Habitat Units Date: 04/07/1987

Period of Analysis: 55
Evaluation Species: 4 DOWNY WOODPECKER AAHU´s: 7.95

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	15.00	0.50	7.50
1	15.00	0.02	0.30
5	15.00	0.02	0.30
10	15.00	0.29	4.35
35	15.00	0.64	9.60
55	15.00	1.00	15.00

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) 1B AND REVEG
Period of Analysis: 55
Evaluation Species: 5 RACCOON AAHU´s: 7.51

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	15.00	0.50	7.50
1	15.00	0.22	3.30
5	15.00	0.22	3.30
10	15.00	0.33	4.95
35	15.00	0.64	9.60
55	15.00	0.64	9.60

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS REACH 1B
Action: PA 1 (without project) NO PROJECT
Period of Analysis: 55
Evaluation Species: 1 YELLOW WARBLER AAHU´s: 1.82

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	2.02	0.90	1.82
1	2.02	0.90	1.82
5	2.02	0.90	1.82
10	2.02	0.90	1.82
35	2.02	0.90	1.82
55	2.02	0.90	1.82

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS REACH 1B
Action: PA 1 (without project) NO PROJECT
Period of Analysis: 55
Evaluation Species: 2 NORTHERN ORIOLE AAHU´s: 1.41

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	2.02	0.70	1.41
1	2.02	0.70	1.41
5	2.02	0.70	1.41
10	2.02	0.70	1.41
35	2.02	0.70	1.41
55	2.02	0.70	1.41

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS REACH 1B
Action: PA 1 (without project) NO PROJECT
Period of Analysis: 55
Evaluation Species: 3 COMMON YELLOWTHROAT AAHU´s: 0.40

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	2.02	0.20	0.40
1	2.02	0.20	0.40
5	2.02	0.20	0.40

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS REACH 1B
Action: PA 1 (without project) NO PROJECT
Period of Analysis: 55
Evaluation Species: 4 DOWNY WOODPECKER AAHU´s: 2.02

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	2.02	1.00	2.02
1	2.02	1.00	2.02
5	2.02	1.00	2.02
10	2.02	1.00	2.02
35	2.02	1.00	2.02
55	2.02	1.00	2.02

Form C: Average Annual Habitat Units Date: 04/07/1987

Study Name: CALABAZAS REACH 1B
Action: PA 1 (without project) NO PROJECT
Period of Analysis: 55
Evaluation Species: 5 RACCOON AAHU´s: 2.02

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	2.02	1.00	2.02
1	2.02	1.00	2.02
5	2.02	1.00	2.02
10	2.02	1.00	2.02
35	2.02	1.00	2.02
55	2.02	1.00	2.02

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 1 (without project) NO PROJECT
Target Year: 0

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	15.00	0.30	4.50
2	NORTHERN ORIOLE	15.00	0.20	3.00
3	COMMON YELLOWTHROAT	15.00	0.50	7.50
4	DOWNY WOODPECKER	15.00	0.50	7.50
5	RACCOON	15.00	0.50	7.50

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 2 (with project) PROJECT NO REVEG
Target Year: 1

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	15.00	0.00	0.00
2	NORTHERN ORIOLE	15.00	0.05	0.75
3	COMMON YELLOWTHROAT	15.00	0.00	0.00
4	DOWNY WOODPECKER	15.00	0.10	1.50
5	RACCOON	15.00	0.14	2.10

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS REACH 1B
Action: PA 3 (with project) PROJECT WITH REVEGET
Target Year: 0

Evaluation Species ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	2.02	0.90	1.82
2	NORTHERN ORIOLE	2.02	0.70	1.41
3	COMMON YELLOWTHROAT	2.02	0.20	0.40
4	DOWNY WOODPECKER	2.02	1.00	2.02
5	RACCOON	2.02	1.00	2.02

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS REACH 1B
Action: PA 3 (with project) PROJECT WITH REVEGET
Target Year: 1

Evaluation Species ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	2.02	0.00	0.00
2	NORTHERN ORIOLE	2.02	0.20	0.40
3	COMMON YELLOWTHROAT	2.02	0.00	0.00
4	DOWNY WOODPECKER	2.02	0.10	0.20
5	RACCOON	2.02	0.20	0.40

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS REACH 1B
Action: PA 3 (with project) PROJECT WITH REVEGET
Target Year: 5

Evaluation Species ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	2.02	0.00	0.00
2	NORTHERN ORIOLE	2.02	0.20	0.40
3	COMMON YELLOWTHROAT	2.02	0.00	0.00
4	DOWNY WOODPECKER	2.02	0.10	0.20
5	RACCOON	2.02	0.20	0.40

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS REACH 1B
Action: PA 3 (with project) PROJECT WITH REVEGET
Target Year: 10

Evaluation Species ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	2.02	0.20	0.40
2	NORTHERN ORIOLE	2.02	0.40	0.81
3	COMMON YELLOWTHROAT	2.02	0.00	0.00
4	DOWNY WOODPECKER	2.02	0.20	0.40
5	RACCOON	2.02	0.40	0.81

Form B: Habitat Units Date: 04/07/1987

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	15.00	0.10	1.50
2	NORTHERN ORIOLE	15.00	0.50	7.50
3	COMMON YELLOWTHROAT	15.00	0.00	0.00
4	DOWNY WOODPECKER	15.00	0.60	9.00
5	RACCOON	15.00	0.60	9.00

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) PROJECT WITH REVEG
Target Year: 55

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	15.00	0.10	1.50
2	NORTHERN ORIOLE	15.00	0.50	7.50
3	COMMON YELLOWTHROAT	15.00	0.00	0.00
4	DOWNY WOODPECKER	15.00	1.00	15.00
5	RACCOON	15.00	0.60	9.00

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) 1B AND REVEG
Target Year: 0

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	15.00	0.30	4.50
2	NORTHERN ORIOLE	15.00	0.20	3.00
3	COMMON YELLOWTHROAT	15.00	0.50	7.50
4	DOWNY WOODPECKER	15.00	0.50	7.50
5	RACCOON	15.00	0.50	7.50

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) 1B AND REVEG
Target Year: 1

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	15.00	0.09	1.35
2	NORTHERN ORIOLE	15.00	0.12	1.80
3	COMMON YELLOWTHROAT	15.00	0.02	0.30
4	DOWNY WOODPECKER	15.00	0.02	0.30
5	RACCOON	15.00	0.22	3.30

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) 1B AND REVEG
Target Year: 5

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	15.00	0.09	1.35
2	NORTHERN ORIOLE	15.00	0.11	1.65
3	COMMON YELLOWTHROAT	15.00	0.02	0.30
4	DOWNY WOODPECKER	15.00	0.02	0.30
5	RACCOON	15.00	0.22	3.30

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) 1B AND REVEG
Target Year: 10

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	15.00	0.27	4.05
2	NORTHERN ORIOLE	15.00	0.29	4.35
3	COMMON YELLOWTHROAT	15.00	0.02	0.30
4	DOWNY WOODPECKER	15.00	0.29	4.35
5	RACCOON	15.00	0.33	4.95

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) PROJECT WITH REVEG
Target Year: 0

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	15.00	0.30	4.50
2	NORTHERN ORIOLE	15.00	0.20	3.00
3	COMMON YELLOWTHROAT	15.00	0.50	7.50
4	DOWNY WOODPECKER	15.00	0.50	7.50
5	RACCOON	15.00	0.50	7.50

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) PROJECT WITH REVEG
Target Year: 1

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	15.00	0.00	0.00
2	NORTHERN ORIOLE	15.00	0.00	0.00
3	COMMON YELLOWTHROAT	15.00	0.00	0.00
4	DOWNY WOODPECKER	15.00	0.10	1.50
5	RACCOON	15.00	0.14	2.10

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) PROJECT WITH REVEG
Target Year: 5

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	15.00	0.00	0.00
2	NORTHERN ORIOLE	15.00	0.06	0.90
3	COMMON YELLOWTHROAT	15.00	0.00	0.00
4	DOWNY WOODPECKER	15.00	0.10	1.50
5	RACCOON	15.00	0.14	2.10

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) PROJECT WITH REVEG
Target Year: 10

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	15.00	0.20	3.00
2	NORTHERN ORIOLE	15.00	0.26	3.90
3	COMMON YELLOWTHROAT	15.00	0.00	0.00
4	DOWNY WOODPECKER	15.00	0.20	3.00
5	RACCOON	15.00	0.30	4.50

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) PROJECT WITH REVEG

Action: PA 3 (with project) PROJECT WITH REVEGET
Target Year: 35

Evaluation Species ID#	Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	2.02	0.10	0.20
2	NORTHERN ORIOLE	2.02	0.50	1.01
3	COMMON YELLOWTHROAT	2.02	0.00	0.00
4	DOWNY WOODPECKER	2.02	0.60	1.21
5	RACCOON	2.02	0.60	1.21

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS REACH 1B
Action: PA 3 (with project) PROJECT WITH REVEGET
Target Year: 55

Evaluation Species ID#	Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	2.02	0.10	0.20
2	NORTHERN ORIOLE	2.02	0.50	1.01
3	COMMON YELLOWTHROAT	2.02	0.00	0.00
4	DOWNY WOODPECKER	2.02	1.00	2.02
5	RACCOON	2.02	0.60	1.21

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	15.00	0.18	2.7[illegible]
2	NORTHERN ORIOLE	15.00	0.52	7.80
3	COMMON YELLOWTHROAT	15.00	0.02	0.30
4	DOWNY WOODPECKER	15.00	0.64	9.6[illegible]
5	RACCOON	15.00	0.64	9.6[illegible]

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS CREEK
Action: PA 3 (with project) 1B AND REVEG
Target Year: 55

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	15.00	0.18	2.7[illegible]
2	NORTHERN ORIOLE	15.00	0.52	7.80
3	COMMON YELLOWTHROAT	15.00	0.02	0.30
4	DOWNY WOODPECKER	15.00	1.00	15.0[illegible]
5	RACCOON	15.00	0.64	9.60

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS REACH 1B
Action: PA 2 (with project) PROJECT NO REVEGETAT
Target Year: 1

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	2.02	0.00	0.00
2	NORTHERN ORIOLE	2.02	0.20	0.40
3	COMMON YELLOWTHROAT	2.02	0.00	0.00
4	DOWNY WOODPECKER	2.02	0.10	0.20
5	RACCOON	2.02	0.20	0.40

Form B: Habitat Units Date: 04/07/1987

Study Name: CALABAZAS REACH 1B
Action: PA 1 (without project) NO PROJECT
Target Year: 0

Evaluation ID#	Species Name	Area of Habitat	Habitat Suitability Index	Habitat Units
1	YELLOW WARBLER	2.02	0.90	1.82
2	NORTHERN ORIOLE	2.02	0.70	1.4[illegible]
3	COMMON YELLOWTHROAT	2.02	0.20	0.4[illegible]
4	DOWNY WOODPECKER	2.02	1.00	2.02
5	RACCOON	2.02	1.00	2.02

APPENDIX S-IV

ARMY CORPS OF ENGINEERS PUBLIC NOTICE AND SECTION 404 PERMIT

Public Notice

US Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105

8/2 WFC w/a
SMW "
RRE "
RRT "
JAM "
SNW "
JMF "
BHG "

PUBLIC NOTICE NO. 16833S92

DATE: 26 July 1990

REPLY TO: REGULATORY BRANCH

RESPONSE REQUIRED BY: 26 August 1990

AUG 2 1990

1. The Santa Clara Valley Water District, 5750 Almaden Expressway, San Jose, California 95118, contact person Jeff Micko has applied for a Department of the Army permit to construct flood control measures to provide 1% flood protection on 8 miles of Calabazas Creek between Guadalupe Slough and Miller Avenue in the cities of Santa Clara, Sunnyvale and Cupertino, in Santa Clara County, California. This application is being processed pursuant to the provisions of Section 404 of the Clean Water Act (33 U.S.C. 1344).

2. As shown on the attached drawings the proposed project would be constructed in phases and would include raising existing levees, raising and floodproofing bridges, constructing in-channel maintenance roads, placing concrete lining under and adjacent to bridges, regrading existing channel reaches, installing gabion slope protection, constructing a short bypass channel, replacing some bridges and adding additional cells to culverts. This would require excavation of approximately 90,000 cubic yards of soil and sediments and placement of approximately 85,000 cubic yards of earth fill. Approximately 13,500 cubic yards of gabions (rock-filled wire baskets) would be placed within the creek for erosion protection. Another 6,500 cubic yards of concrete would be placed within the channel in conjunction with bridge modifications and channel transitions.

3. The applicant has been informed to notify the Regional Water Quality Control Board, San Francisco Bay Region, to determine the need for State water quality certification. If the State Water Resources Control Board determines that this project is consistent with the California Water Quality Control Plan, Requirements adopted by the Regional Board and Sections 301, 302, 303, 306 and 307 of the Clean Water Act, the State will issue a Certificate of Conformance with Water Quality Standards to the project proponent. Those parties concerned with any water quality problems that may be associated with this project should write to the Executive Officer, California Regional Water Quality Control Board, San Francisco Bay Region, 1800 Harrison Street, Suite 700, Oakland, California 94612, by the close of the comment period of this public notice.

4. Corps of Engineers has assessed the environmental impacts of the action proposed in subject permit application is accordance with the requirements of the National Environmental Policy Act of 1969 (Public Law 91-190), and pursuant to Council on Environmental Quality's Regulations 40 CFR 1500-1508, and Corps of Engineers' Regulations, 33 CFR 230 and 325. Unless otherwise stated, the Preliminary Environmental Assessment presented herein describes only the impacts

(direct, indirect, and cumulative) resulting from activities within the jurisdiction of the Corps of Engineers. The Environmental Matrix and other worksheets and supporting data used in the preparation of this Preliminary Environmental Assessment are on file in the Impact Analysis Section, Regulatory Branch, Corps of Engineers, 211 Main Street, San Francisco, California.

The Preliminary Environmental Assessment, which summarizes some information from the Calabazas Creek Planning Study consisting of the Engineer's Report and Draft Environmental Impact Report by Santa Clara Valley Water District (SCVWD), and the Biologist's Reports which resulted in the following findings:

a. IMPACTS ON THE AQUATIC ECOSYSTEM

(1) Physical/Chemical Characteristics and Anticipated Changes

Substrate - Implementation of this project would replace the existing substrate with fill totaling 603,423 square feet, or 13.85 acres. The fill consists of the following: placement of 128,379 square feet of gabion area, placement of 123,684 square feet of concrete area, placement of 7,480 square feet of rock area, and placement of 343,880 square feet of material for maintenance roads. The adverse impact of the fill is considered to be moderate.

Reach 1: Lawrence Expressway to Lochinvar Avenue (See Sheets 1, 2, 4 and 5). The proposed measures include mattress and stepped gabions, bypass channel, and the addition of two 12' by 10' culverts at Lochinvar Avenue. This work entails the filling of approximately 23,180 square feet (sq. ft.) of gabion area (measured by length of gabion X 2 sides X 4.6 feet above ordinary high water (OHW) +3 feet below existing ground), 10,400 sq. ft. of concrete area (measured surface area), 1300 sq. ft. of rock area (measured surface are), for a total of 34,880 sq. ft.

The proposed steeped gabion lined channel (Sheet 4) constructed from Lawrence Expressway to 600 feet upstream would be aligned to accommodate existing native trees along the bank. As part of the proposed conceptual mitigation plan, plantings of native riparian vegetation would be made in the upper 4 gabion courses, earth slopes, and flat areas along the channel margins within the right-of-way. A concrete maintenance ramp would be constructed immediately upstream of Lawrence Expressway, and the concrete transition at Lawrence Expressway would be constructed to conform to the modified channel.

A mattress gabion bypass channel is proposed from 600 feet upstream of Lawrence Expressway to 1200 feet upstream of Lawrence Expressway to avoid impacts to the existing natural channel. The high flow bypass channel would be aligned parallel to the west bank of the existing channel for approximately 600 feet (Sheet 4). Santa Clara Valley Water District (SCVWD) has purchased the adjacent parcel which is presently an orchard. An existing irrigation pipe which crosses over the channel would be relocated under the channel as part of the project.

A proposed mattress gabion channel would be aligned 1200 feet upstream of Lawrence Expressway to Lochinvar Avenue. Planting of native riparian species would be made in the upper two gabion courses, in the earth slopes, and flat areas along the channel margin within the right-of-way. A concrete maintenance ramp would be constructed immediately downstream of Lochinvar Avenue to provide continuous access throughout Reach 1. The existing double 12-foot by 9-foot reinforced concrete culvert at Lochinvar Avenue would be augmented by constructing an additional 12-foot by 10-foot reinforced concrete culvert on each side.

Reach 2: (See Sheets 1, 2 and 4) Lochinvar Avenue to Homestead Road (approximately 800 feet). The proposed measures include mattress and stepped gabions and an addition of two 11-foot by 10-foot culverts at Homestead Avenue. This work entails the filling of 0.50 acres, including 12,008 sq. ft. of gabion area, 8,680 sq. ft. of concrete area, and 1,240 sq. ft. of rock area, for a total of 21,928 sq. ft. of fill area.

Reach 3: (See Sheets 1, 2, 5 and 6) Homestead Road to Pruneridge Avenue. The proposed measures include stepped gabions and an addition of two 11-foot by 10-foot culverts at Pruneridge Avenue. Concrete maintenance ramps would be constructed upstream of Homestead Avenue and downstream of Pruneridge Avenue to provide continuous access throughout this reach. The work on reach 3 entails the filling of 0.97 acres, including 30,400 sq. ft. of gabion area, 10,360 sq. ft. of concrete area, and 1500 sq. ft. of rock area, for a total of 42,260 sq. ft. of fill area.

Reach 4: (See Sheets 1, 2 and 6) Pruneridge Avenue to Tantau Avenue (approximately 1525 feet). The proposed measures include stepped gabions and an addition of two 11-foot by 10-foot culverts at Tantau. The stepped gabions would start at Pruneridge Avenue and be aligned to preserve existing trees on the east bank for a length of 1,500 feet. Continuous fencing of the right-of-way would be provided as part of this project. Concrete maintenance ramps would be constructed of Pruneridge Avenue and downstream of Tantau Avenue for access to the channel in this reach. The existing double 10-foot by 8-foot reinforced concrete culvert at Tantau Avenue would be augmented by constructing a double 11-foot by 10-foot reinforced concrete culvert. The work on reach 4 entails the filling of 0.77 acres, including 23,347 sq. ft. of gabion area, 8,960 sq. ft. of concrete area, and 1280 sq. ft. of rock area, for a total of 33,587 sq. ft. of fill area.

Reach 5: (See Sheets 1, 2 and 5) Tantau Avenue to Interstate 280 (approximately 1,075 feet). The proposed measures include mattress gabions for an estimated fill of 0.61 acres, including 17,176 sq. ft. of gabion area, 8,400 sq. ft. of concrete area, and 1200 sq. ft. of rock area, for a total of 26,776 sq. ft. of fill area. Continuous fencing would be installed along the right-of-way, and locking gates would be installed at access ramps. A concrete maintenance ramp would be constructed upstream of Tantau Avenue which would be the sole means of access for maintenance in Reach 5. The existing sacked concrete culvert transition downstream of the Highway 280 culvert would be placed with a reinforced concrete transition. This would improve hydraulic performance and provide more reliable protection to adjoining properties.

Reach 6 and 7: Highway 280 to Vallejo Parkway to Stevens Creek Boulevard (approximately 1,510 feet). No modifications are proposed.

Reach 8: (See Sheets 1, 2 and 4) Stevens Creek Boulevard to Miller Avenue (approximately 975 feet). The proposed measures include stepped gabions and a clear span bridge at Miller Avenue. This work entails the filling of 0.73 acres, including 22,268 sq. ft. of gabion area, 8,680 sq. ft. of concrete area, and 960 sq. ft. of rock area, for a total of 31,908 sq. ft. of fill area. A concrete access ramp for maintenance would be constructed along the east bank immediately downstream of the District's walkway easement. The existing reinforced concrete culvert at Miller Avenue would be removed and replaced with a clear span bridge.

Reach 9: (See Sheets 1 and 3) Guadalupe Slough to Highway 237 (approximately 1650 feet). Proposed measures include raising levees 4 feet, constructing depressed maintenance roads, floodproofing Moffett Park Drive Bridge, and raising bridges at Highway 237 (by Caltrans). This work entails the filling of 2.76 acres, including 90,170 sq. ft. of maintenance road area, 30,020 sq. ft. of concrete lining area, for a total of 120,190 sq. ft. of fill area. The rebuilt levees would include an embedded reinforcing material to allow steeper side slopes. Fifteen-foot-wide depressed maintenance roads would be constructed adjacent to levees at elevation 7. The existing low flow channel would be realigned adjacent to the westerly maintenance road. These roads would be surfaced with a crushed rock material. The existing floodwall adjacent to the City of Sunnyvale's storm water pumping facility would be raised or replaced. A new concrete floodwall is proposed to connect to the existing floodwall and extend approximately 200 feet upstream. The outfalls from the pumping facility would be extended under a proposed maintenance road. The proposed bridge improvements include the construction of concrete floodwalls to floodproof the existing bridge at Moffett Park Drive which is located 50 feet downstream of Highway 237. (There is a possibility that this bridge will no longer be required in which case it would be removed). The floodwalls would tie into the proposed raised levees. The existing east and westbound bridges for Highway 237 will be demolished and replaced with new bridges as part of the State Highway project. To facilitate maintenance, concrete lining and ramps to the channel bottom are proposed immediately under the bridges.

Reach 10: (See Sheets 1 and 3) Highway 237 to Old Mountain View/Alviso Road (approximately 475 feet): The proposed measures include raising levees by 4 feet, constructing depressed maintenance roads, and floodproofing Old Mountain View-Alviso Road. This work entails the filling of 0.60 acres, including 14,800 sq. ft. of maintenance road area, 11,320 sq. ft. of concrete lining area, for a total of 26,130 sq. ft. of fill area. The rebuilt levees would include an embedded reinforcing material to allow steeper side slopes. Depressed maintenance roads would be constructed adjacent to levees at elevation 7. The existing low flow channel would be realigned adjacent to the westerly depressed maintenance road (Figure 1). The area between the proposed maintenance roads would be designated as habitat area the same as for each 9. The proposed bridge modifications include the construction of concrete floodwalls to floodproof the Old Mountain View-Alviso Road Bridge. These floodwalls would tie into the proposed raised levees. To facilitate maintenance, concrete lining and ramps to the channel bottom are proposed immediately under the bridge.

Reach 11: (See Sheets 1 and 3) Mountain View/Alviso road to Tasman Drive (approximately 3150 feet). Proposed measures (Figure 1) include raising levees by 4 feet, constructing depressed maintenance roads, and floodproofing Tasman Drive Bridge. This work entails the filling of 3.55 acres, including 135,910 sq. ft. of maintenance road area, 18,730 sq. ft. of concrete lining area, for a total of 154,640 sq. ft. of fill area. The raised rebuilt levees would be reinforced and the side slopes increased. Depressed maintenance roads would be constructed on either side and adjacent to levees at elevation 7. The existing low flow channel would be realigned to the watery maintenance road. Upstream of Old Mountain View-Alviso Road for 950 feet a continuous lateral drain is proposed to relieve a standing water problem on the west bank. Between the proposed depressed maintenance roads, the area along the low flow channel would designated as a habitat area similar to that described for reach 9. The proposed bridge improvements include constructing concrete channel lining maintenance roads and ramps under the Tasman Drive Bridge to facilitate channel maintenance. This bridge is also proposed to be floodproofed by grouting any openings below the existing parapet wall, raising the wall, and extending it into the proposed raised levees.

Reach 12: (See Sheets 1 and 3) Tasman Drive to Highway 101 (approximately 5225 feet). The proposed measures include constructing a floodwall along the west bank, raising the levee by 4 feet for 3,000 feet from Tasman then placing floodwall to Highway 101, and constructing depressed maintenance roads (Figure 2). This work entails the filling of 2.37 acres, including 103,000 sq. ft. of maintenance road area, 250 sq. ft. of concrete lining area, for a total of 103,250 sq. ft. of fill area. The raised and rebuilt levee would be reinforced an the side slope steepened. Adjacent to the Mission College property a low concrete floodwall would be constructed at the outside toe of the existing berm. A concrete floodwall would be constructed along the entire west bank. The floodwall would extend 4 to 8 feet above existing ground and would be constructed adjacent to existing ground and would be constructed adjacent to existing fences along the property line. An 18-foot-wide depressed maintenance road would be constructed along the toe of the easterly levee approximately one foot higher than the existing floodplain. A 15-foot-wide maintenance road would be provided along both the westerly top of bank and the easterly levee. All maintenance roads would be surfaced with a crushed rock to provide a wearing surface. An access ramp and a low levee would be tied into the floodwall on the west bank at the Hetch Hetchy pipeline crossing, approximately 1,900 feet upstream of Tasman Road. Flapgates would be installed at all storm drain outfalls in this reach. Along the waterly bank a narrow habitat corridor would be preserved and growth would be unrestricted.

Reach 13: Upstream of Highway 101 to upstream of Arques Avenue, no measures are proposed.

Reach 14: Upstream of Arques Avenue to upstream of Central Expressway, no measures are proposed.

Reach 15: Central Expressway to upstream of Kifer Road for a total length of 1,350 feet; The creek has been confined to a trapezoidal concrete-lined channel. There will be an addition of 0.051 acres of concrete bank.

Reach 16: Upstream of Kifer Road to upstream of Southern Pacific Railroad for a length of 1,300 feet; Addition of 0.041 acres of concrete bottom;

Reach 16A: El Camino storm drain, confluence to 400 feet upstream; Addition of 0.080 acres of concrete bottom; The creek in the reaches of 16 and 16A is a trapezoidal concrete-lined channel up to the 230 foot long double box culvert under the railroad.

Reaches 17 through 24: Upstream of Southern Pacific Railroad to upstream of Pomeroy Avenue, No measures are proposed.

Reach 25: Upstream of Pomeroy Avenue to upstream of Benton Avenue for 3,200 feet. The creek is a trapezoidal concrete channel. There will be an addition of 0.009 acres of concrete bottom.

Reach 26: Upstream of Benton Street to upstream of Lawrence Expressway, No measures are proposed.

Erosion/Sedimentation Rate - The purpose of the stepped gabions and mattress gabions is to stabilize the side slopes of the channel of Calabazas Creek especially during high, flood flows. The majority of the reaches, which were constructed by developers or farmers, have experienced bank erosion and have required maintenance repairs. Rock riprap and concrete rubble have been placed intermittently along the sideslopes to repair eroded banks. Erosion of the channel banks has denuded areas along the creek of vegetation. Step gabions would be constructed with tree wells which would be planted with native riparian vegetation as mitigation for the removal of trees.

Water Quality - Water Quality in the channel influenced by construction would depend on the time of year. If construction work takes place during the dry season as planned, turbidity in the downstream water flow would be reduced. Rainfall after grading activities would increase erosion of sediments from the disturbed surfaces. Revegetating the slopes would curb erosion over the long run. Several reaches contain contaminated soils or groundwater which are discussed in the management plan in the (DEIR).

(2) Biological Characteristics and Anticipated Changes

Wetlands and Wildlife - Calabazas Creek from Guadalupe Slough to Highway 101 includes the following habitat types: emergent wetland, tidal salt marsh, riparian shrub/forest, and tidal mudlflats.

Emergent Wetland - The emergent wetland habitat type within the Calabazas Creek Channel consists primarily of cattails and bulrushes. Along the lower reaches of the Creek, the wetland ranges from 10 to 30 feet in width. Emergent wetland vegetation is a valuable wildlife resource and it provides wildlife, such as Virginia rail, red-winged blackbirds, common yellow throats, song sparrows, marsh wrens, opossums, and raccoons, with cover, foraging and breeding grounds. Wetland vegetation provides a continuous source of deteriorate input into the system.

The proposed work would entail the removal of approximately 4.05 acres total of emergent wetland (including sand-gravel stream bed). The applicant's conceptual mitigation plan calls for approximately 5.51 acres total of emergent wetland.

Tidal Salt-Marsh - Tidal salt-marsh occurs in a narrow strip along the downstream portion of Calabazas Creek before the creek enters Guadalupe Slough. (Tidal influence extends up to the area near Tasman Drive). Plant species include pickleweek, alkali heath, and peppergrass. Construction of the depressed maintenance roads and shifting of the low flow channel would result in removing most of the vegetation between the existing levees. The project impacts are essentially the same as those resulting from regularly scheduled SCVWD maintenance activities. (The Santa Clara Valley Water District SCVWD has a Department of the Army Regional Permit effective to 08 August 1991 to routinely maintain and repair stream banks and embankment erosion, to remove slit and debris, to seal water wells below mean high water for flood control and water conservation adjacent to southern San Francisco Bay in Santa Clara County. SCVWD also has a Memorandum of Understanding with the

California Department of fish and Game for routine maintenance activities in improved channels). The plant species to be removed are resilient, rapid colonizers expected to quickly establish themselves; however, the loss of salt-marsh vegetation eliminates deteriorate input into estuarine waters and temporarily displaces habitat for wildlife. The proposed work would cause the loss of approximately 0.60 acres of salt-affected tidal marsh. The applicant's conceptual mitigation plan calls for the development of 0.587 acres total of tidal marsh.

Riparian Shrub/Forest - This vegetation type occurs on the upper reaches of Calabazas Creek, beyond the reach of tidal waters. Species present include sandbar willows, young cottonwoods, arroyo and yellow willows. Riparian vegetation is the most valuable habitat type in the Calabazas Creek corridor since it supports the greatest variety of wildlife species and since it is a rare habitat type to the area. Some species using the riparian habitat include greenbacked heron, mourning dove, Anna's hummingbird, black phoebe, busted, Bewick's wren, northern mockingbird, yellow-rumped warbler, striped skunk, opossum, and raccoon.

The proposed work would entail the removal of approximately 5.62 acres total of riparian habitat (including vegetated mixed herbaceous and riparian species, and vegetated top of bank). The applicant's conceptual mitigation plan includes the creation of 8.408 acres of riparian habitat (including vegetated earthen bank, vegetated top of bank, vegetated gabion bank, herbaceous gabion bank, and instream riparian).

Tidal mudflats - The downstream reaches of Calabazas Creek experience a considerable variation of exposed surface area due to tidal fluctuation. Aquatic vegetation, including smartwee, knowtwee, watercress, and water primrose, occurs within the open water habitat. Crayfish and other invertebrates inhabit the mudflats. Killdeer, common snipe, mammalian predators such as poison and raccoon are attracted to the mudflats as foraging grounds. Ruddy ducks, cinnamon teal, mallards, gadwall, American coot, and common moorhen use the open water mudflats for foraging and resting areas.

The proposed work entails the removal of approximately 1.508 acres total of open watermudflats. The applicant mitigation plan calls for the replacement of 1.172 acres total of open water mudflats.

Since the applicant has only developed a conceptual mitigation plan at this time, the adequacy of the plan cannot be determined.

Endangered Species - Salt marsh Harvest Mice, Clapper Rails, and Black Rails are not known to occur in the area of Calabazas Creek. Breeding Common Yellow Throats would not be adversely affected by the project construction if the vegetation clearing and construction activities take place after the completion of the breeding season (1 June or Later). Burrowing owls are not known to currently inhabit the Calabazas Creek levees.

Habitat for Fish and Other Aquatic Organisms - Fisheries values of Calabazas Creek were evaluated by The Habitat Restoratio Group, John Stanley and Associates, in March 1989. Results were included in the planning Study of Calabazas Creek (consisting of combined Engineer's report and Draft Environmental Impact Report (DEIR). No fish were collected or observed in Calabazas Creek in 1987, except for goldfish apparently released at mt. Eden Road. California roach (*Lavinia symmetricus*) and threespine stickleback (*Gasterosteus aculeatus*) are thought to have been native to the stream prior to the reduction in flows from groundwater pumping and urbanization. In wet years, it is thought that the stream would be unsuitable for steelhead because of a lack of adequate pools, protective cover, suitable streamflows, and because of barriers preventing access. Other aquatic invertebrates using the steam include the frog (*Hyla regilla*), western toad (*Bufo boreas*), and garter snake (*Thamnophis* spp.). Toad larvae were found to be common in the slow, shallow pools downstream of Rainbow Drive. Since there are no fish presently inhabiting the areas of creek proposed for construction, impacts would primarily be to species introduced in the future.

b. IMPACTS ON RESOURCES OUTSIDE THE AQUATIC ECOSYSTEM

(1) *Biological Characteristics and Anticipated Changes*

Terrestrial Habitat - Since the area of terrestrial habitat lining Calabazas Creek is limited to the edge of the Creek channel, existing conditions and proposed work have been included under riparian descriptions in this asssessment. For a detailed report of the terrestrial system, refer to the Biologist's Report on file with the SCVWD (point of contact, Jeff Micko).

(2.) Socioeconomic Characteristics and Anticipated Changes

Aesthetic Quality - Since certain areas of the project corridor are polluted with trash, old pieces of furniture, and mounds of concrete rubble, the placement of vegetated gabion structures and removal of debris would provide a cleaner corridor.

Public Health and Safety - The project is designed to allow for the creek to contain a 100 year flood event which would, in turn, provide flood protection to the nearby residences, roads, and buildings.

(3) Historic - Cultural Characteristics and Anticipated Changes

A literature search to identify significant cultural resources was conducted for the project's area of potential environmental impact (APEI). It included, but was not limited to, review of the National Register of Historic Places (including monthly supplements), the California Historical Landmarks (1982), and the California Inventory of Historic Resources (1976). Additionally, maps and record of the California Archaeological Inventory were examined. One recorded and two unrecorded (possible) archaeological sites have been identified within or immediately adjacent to the project area.

The project area has previously been surveyed by a qualified professional to identify cultural resources and three areas of prehistoric resources were located (Cartier 1987, 1989; Edwards 1974). Subsurface testing of CA-SCL-134 was conducted in 1974 (Edwards and King). Two other areas, the Warburton Site and the area in the vicinity of Mission College, were not recorded and their significance has not been evaluated. These two sites need to be recorded. In addition, an on-site inspection and coordination with the State Historic Preservation Officer (SHOP) is necessary in order to determine the potential effect on the project on these sites. Additional investigation may be required in order to evaluate their significance, and to determine whether mitigation would be necessary.

c. SUMMARY OF INDIRECT IMPACTS

None have been identified.

d. SUMMARY OF CUMULATIVE IMPACTS

Because of the loss of riparian habitat and wetland areas in Santa Clara Valley due to development in the floodplain (where these habitats are located), the cumulative impacts are considered substantial and impacts need to be reviewed over the Santa Clara Valley area as a whole. Santa Clara Valley has suffered major, cumulative losses of riparian habitat and wetland areas in stream corridors including Guadalupe, Coyote, Matadero, Llagas, Los Gatos, Stevens, San Thomas, Aquino, etc.

e. CONCLUSIONS AND RECOMMENDATIONS

Based on an analysis of the information available, Corps of Engineers has determined that additional data is needed before the significance of the impacts upon the quality of the human environment can be determined. No decision regarding the need for an Environmental Impact Statement (EIS) can, therefore, be made until the Final Environmental Assessment (EA) has been completed.

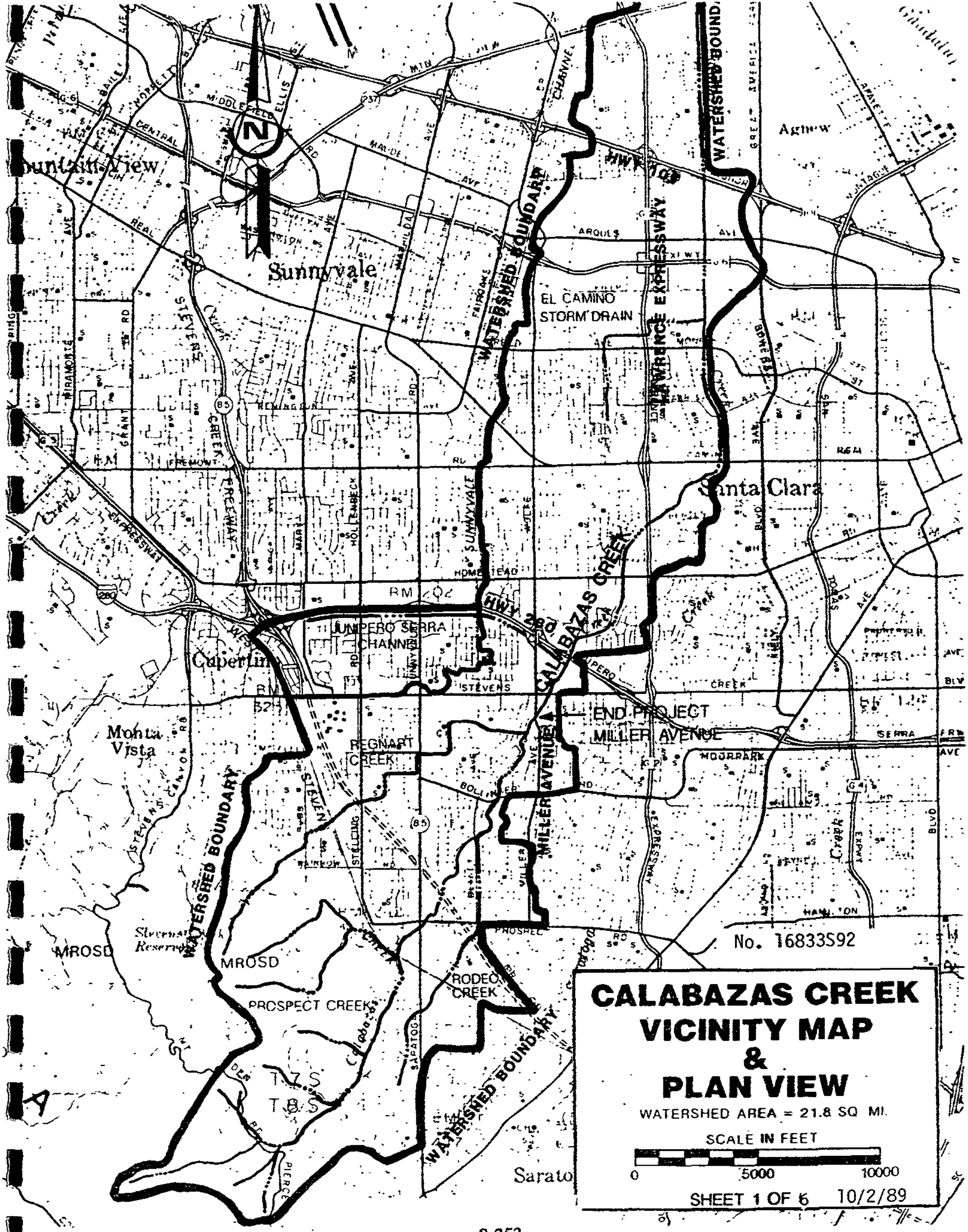
5. Evaluation of this activity's impact on the public interest will also include application of the guidelines promulgated by the Administrator of the Environmental Protection Agency under Section 404(b) of the Clean Water Act, 33 U.S.C. Section 1344(b).

6. The decision whether to issue a permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest. Evaluation of the probable impacts which the proposed activity may have on the public interest requires a careful weighing of all those factors which become relevant in each particular case. The benefits which reasonably may be expected to accrue from the proposal must be balance against its reasonably foreseeable detriments. The decision whether to authorize a proposal, and if so the conditions under which it will be allowed to occur, are therefore determined by the outcome of the general balancing process. That decision will reflect the national concern for both protection and utilization of important resources. All factors which may be relevant to the proposal must be considered including the cumulative effects thereof. Among those are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and, in general, the needs and welfare of the people.

7. The Corps of Engineers is soliciting comments from the public, Federal, State and local agencies and officials, Indian Tribes, and other interested parties in order to

consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

8. Interested parties may submit in writing any comments concerning this activity. Comments should include the applicant's name, the number, and the date of this notice and should be forwarded so as to reach this office within the comment period specified on page one of this notice. Comments should be sent to: Lieutenant Colonel Stanley G. Phernambucq, District Engineer, Attention: Regulatory Branch. It is Corps policy to forward any such comments which include objections to the applicant for resolution or rebuttal. Any person may also request, in writing, within the comment period of this notice that a public hearing be held to consider this application. Requests for public hearings shall state, with particularity, the reasons for holding a public hearing. Additional details may be obtained by contacting the applicant whose address is indicated in the first paragraph of this notice, or by contacting Frank Kelleher of our office (telephone 415-744-3324 ext. 236). Details on any changes of a minor nature which are made in the final permit action will be provided on request.



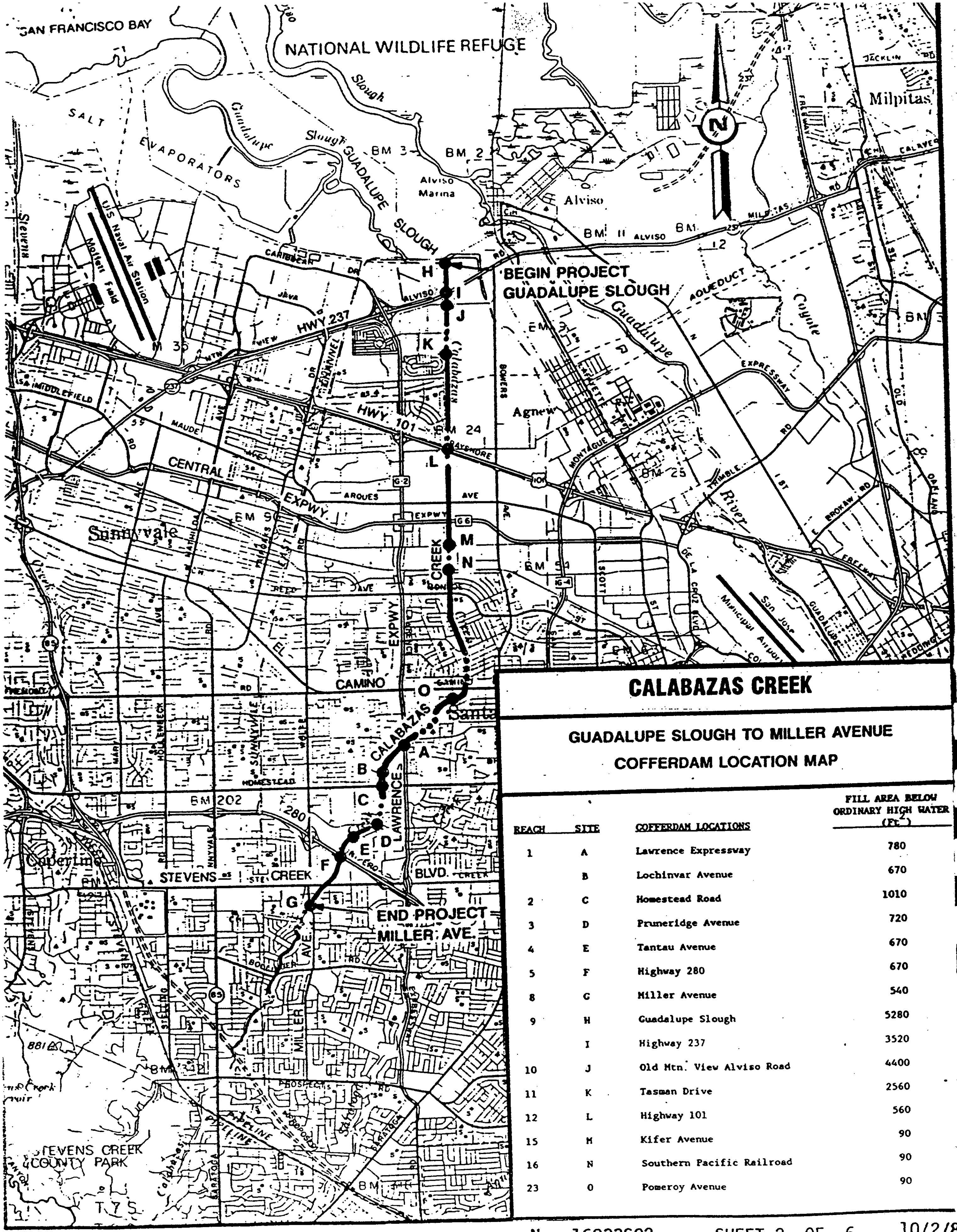
No. 16833S92

CALABAZAS CREEK VICINITY MAP & PLAN VIEW

WATERSHED AREA = 21.8 SQ MI

SCALE IN FEET

SHEET 1 OF 6 10/2/89



CALABAZAS CREEK

GUADALUPE SLOUGH TO MILLER AVENUE
COFFERDAM LOCATION MAP

REACH	SITE	COFFERDAM LOCATIONS	FILL AREA BELOW ORDINARY HIGH WATER (Ft²)
1	A	Lawrence Expressway	780
	B	Lochinvar Avenue	670
2	C	Homestead Road	1010
3	D	Pruneridge Avenue	720
4	E	Tantau Avenue	670
5	F	Highway 280	670
8	G	Miller Avenue	540
9	H	Guadalupe Slough	5280
	I	Highway 237	3520
10	J	Old Mtn. View Alviso Road	4400
11	K	Tasman Drive	2560
12	L	Highway 101	560
15	M	Kifer Avenue	90
16	N	Southern Pacific Railroad	90
23	O	Pomeroy Avenue	90

No. 16833S92 SHEET 2 OF 6 10/2/89

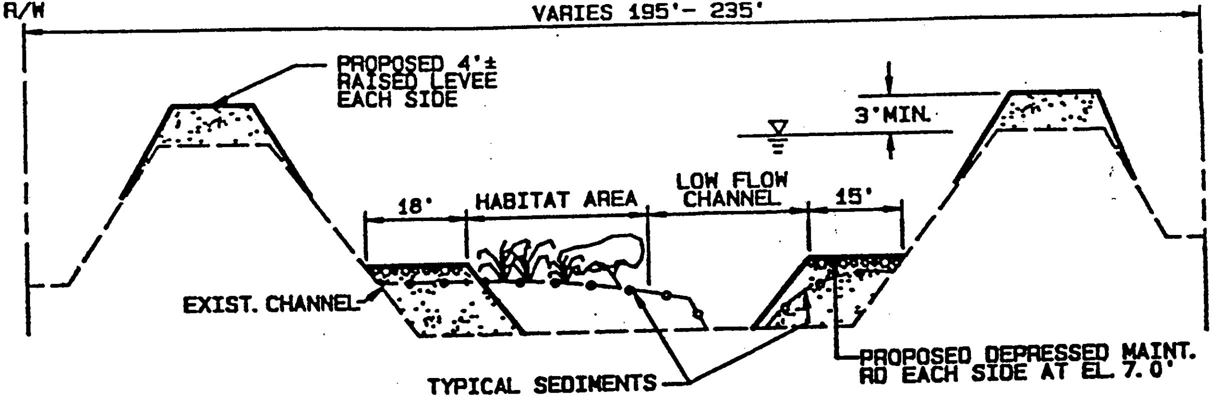


FIGURE 1

GUADALUPE SLOUGH TO TASMAN DRIVE

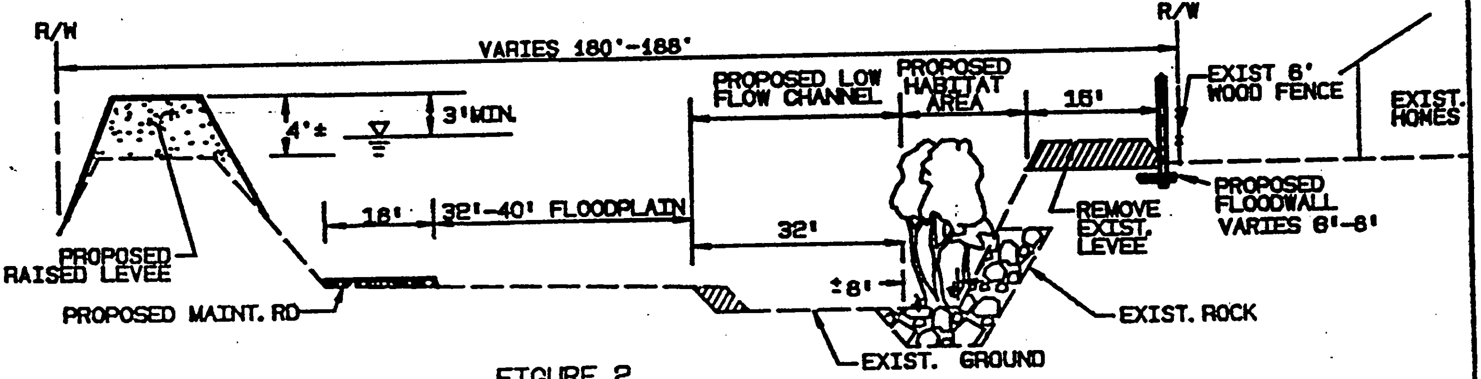


FIGURE 2

TASMAN DRIVE TO MISSION COLLEGE

LEGEND

▒ FILL

▨ EXCAVATION

NOT TO SCALE

PROPOSED CHANNEL CONSTRUCTION ON
CALABAZAS CREEK IN THE CITIES OF
SANTA CLARA, SUNNYVALE & CUPERTINO
IN SANTA CLARA COUNTY. APPLICATION BY
SANTA CLARA VALLEY WATER DISTRICT.

NOTES

1. Elevation Datum N.G.V.D. 1929 Adjusted 1976.
2. Channel Invert Elevation Varies From -4 To 16.7
3. All Cross Sections Are Shown Looking Upstream.
4. Total Excavation = 65,000 C.Y.
   Total Fill = 5,500 C.Y.

SHEET 3. OF 6 DATE 10/2/89

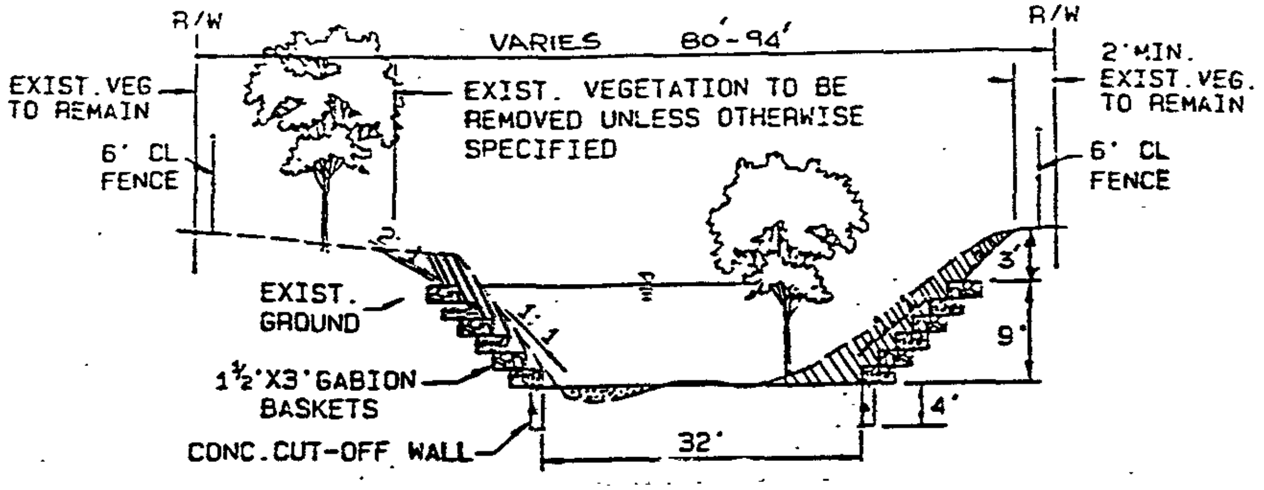


FIGURE 3

STEPPED GABION LINED CHANNEL

1. Lawrence Expressway to 600' upstream
2. 560' upstream of Lochinvar Ave. to Homestead Road
3. Stevens Creek Blvd. to Miller Avenue

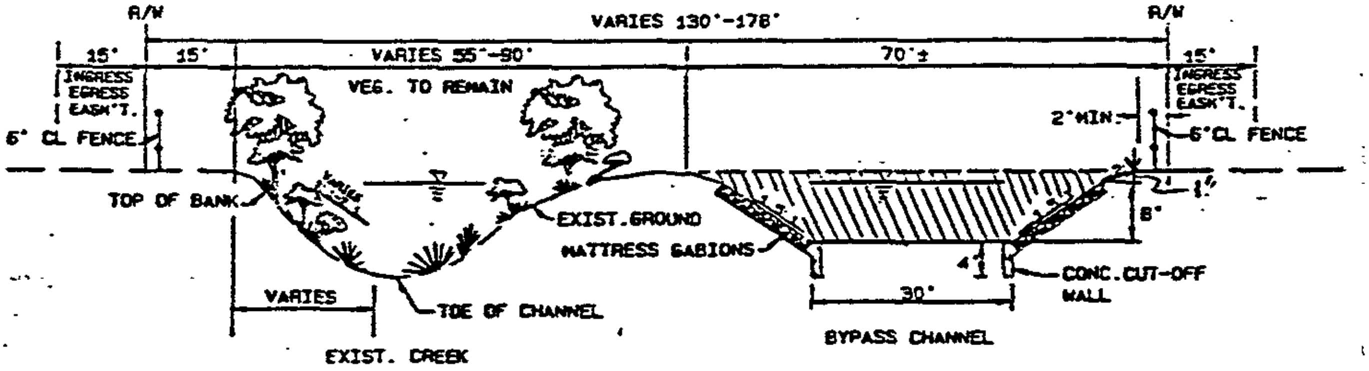


FIGURE 4

MATTRESS GABION BYPASS CHANNEL

1. 600' upstream Lawrence Express. to 1200' upstream of Lawrence Express.

LEGEND

▨ FILL

▨ EXCAVATION

NOT TO SCALE

PROPOSED CHANNEL CONSTRUCTION ON
CALABAZAS CREEK IN THE CITIES OF
SANTA CLARA, SUNNYVALE & CUPERTINO
IN SANTA CLARA COUNTY. APPLICATION BY
SANTA CLARA VALLEY WATER DISTRICT.

NOTES

1. Elevation Datum N.G.V.D. 1929 Adjusted 1976.
2. Channel Invert Elevation Varies From -4 ;To 187
3. *All Cross Sections Are Shown Looking Upstream.*
4. Total Excavation = 65,000 C.Y.
   Total Fill = 5,500 C.Y.

SHEET 4 OF 6 DATE 10/2/89

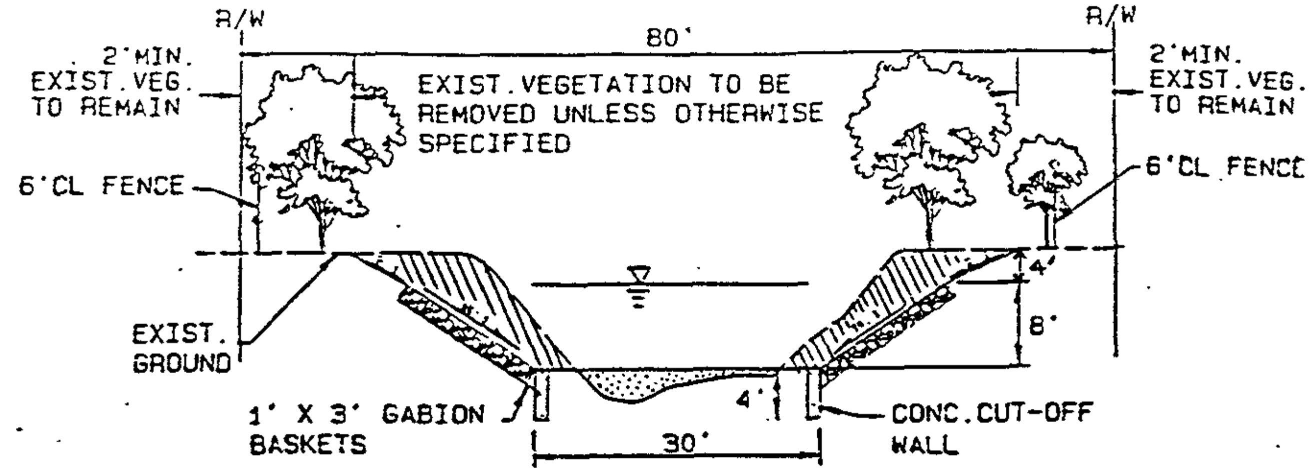


FIGURE 5

MATTRESS GABION LINED CHANNEL

1. 1200' upstream Lawrence Express. to Lochinvar Ave.
2. Tantau Ave. to Highway 280

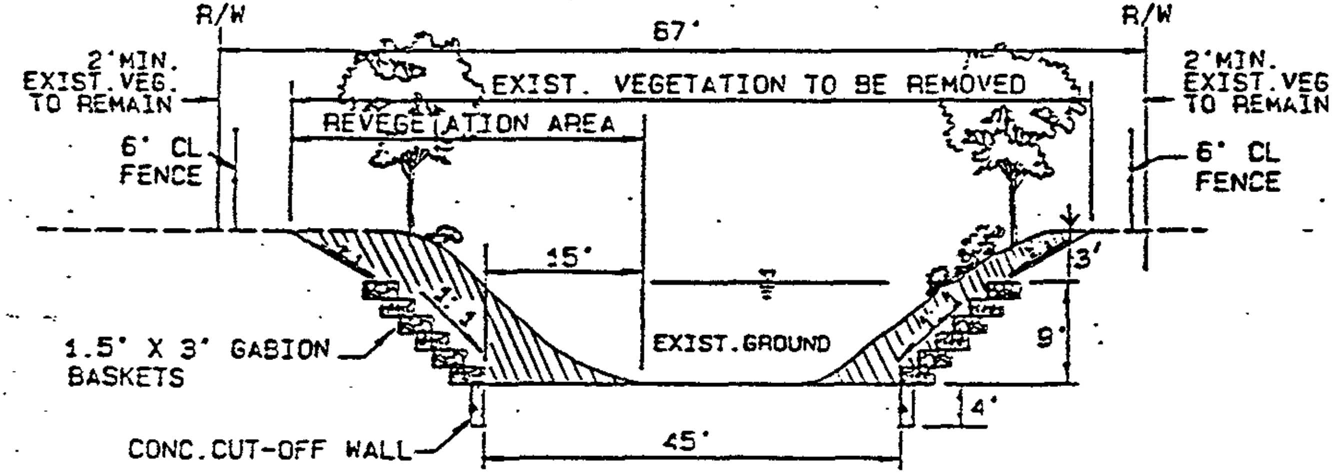


FIGURE 6

WIDENED STEPPED GABION LINED CHANNEL

1. Homestead Road to 800' upstream

LEGEND

░ FILL

▨ EXCAVATION

NOT TO SCALE

PROPOSED CHANNEL CONSTRUCTION ON
CALABAZAS CREEK IN THE CITIES OF
SANTA CLARA, SUNNYVALE & CUPERTINO
IN SANTA CLARA COUNTY. APPLICATION BY
SANTA CLARA VALLEY WATER DISTRICT.

NOTES

1. Elevation Datum N.G.V.D. 1929 Adjusted 1976.
2. Channel Invert Elevation Varies From -4 To 187
3. All Cross Sections Are Shown Looking Upstream.
4. Total Excavation = 65,000 C.Y.
   Total Fill = 5500 C.Y.

SHEET 5 OF 6 DATE 10/2/89

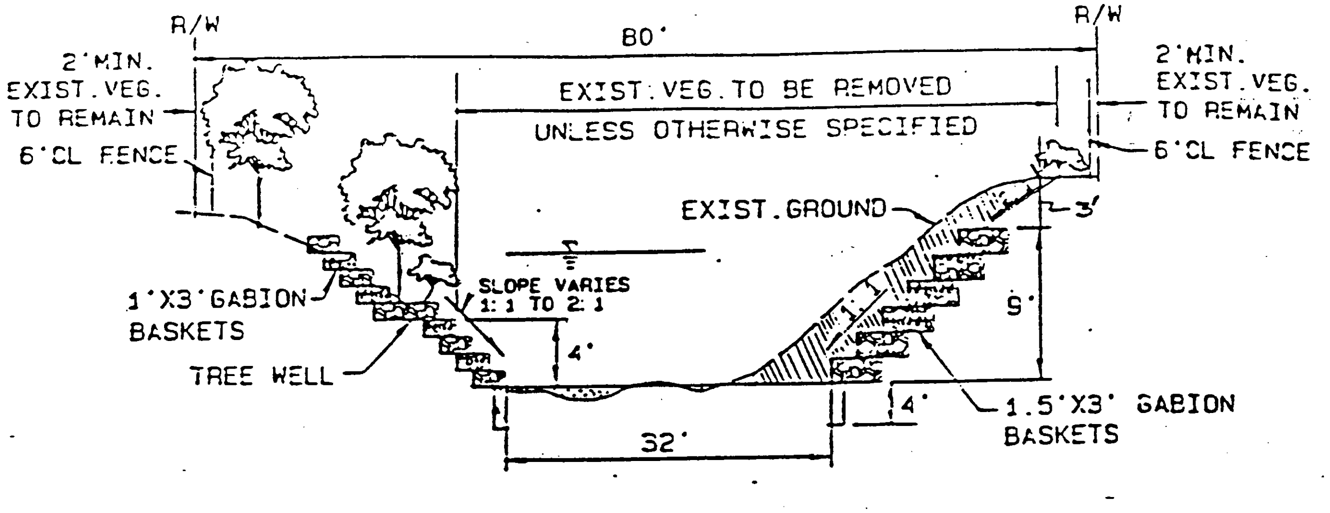


FIGURE 7

VARIABLE SLOPE STEPPED GABION LINED CHANNEL

1. 800' upstream of Homestead Road to Tantau Ave.

LEGEND

░ FILL

▨ EXCAVATION

NOT TO SCALE

PROPOSED CHANNEL CONSTRUCTION ON CALABAZAS CREEK IN THE CITIES OF SANTA CLARA, SUNNYVALE & CUPERTINO IN SANTA CLARA COUNTY. APPLICATION BY SANTA CLARA VALLEY WATER DISTRICT.

NOTES

1. Elevation Datum N.G.V.D. 1929 Adjusted 1976.
2. Channel Invert Elevation Varies From -4 To 157
3. All Cross Sections Are Shown Looking Upstream.
4. Total Excavation = 65,000 C.Y.
   Total Fill = 5,500 C.Y.

SHEET 6 OF 6 DATE 10/2/89

PROJECT MODIFICATION SUBSEQUENT TO THE PUBLIC NOTICE

The following letter summarizes negotiations that took place between the Santa Clara Valley Water District (District) and Caltrans regarding the design of the levee separating the District's mitigation site in Reach 9 and the Caltrans mitigation site. The Caltrans mitigation site is bounded by Calabazas Creek, San Tomas Creek, and State Highway 237. (See Figure 4 of the "Brackish Marsh Habitat Mitigation and Monitoring Plan," Appendix S-1.) It is as a result of these negotiations that the design for Reach 9 was modified from that shown in Figure 1 of the Public Notice to that shown in Figure 1A of the issued Section 404 permit.

STATE OF CALIFORNIA--BUSINESS, TRANSPORTATION AND HOUSING AGENCY
PETE WILSON, Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 4, OFFICE OF PROJECT DEVELOPMENT
SANTA CLARA COUNTY
1754 Technology Drive, Suite 228
San Jose, CA 95110

(408) 452-7300

February 18, 1992

Ms. Sue Tippets
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Dear Ms. Tippetts:

SUBJECT: **SR-237 WETLANDS MITIGATION SITE**
CONTRACT NO. 437914

We are submitting revised plans for the construction of the SR 237 Wetlands Mitigation Site north of SR 237 between Calabazas and San Tomas Aquino Creeks. The plans have been revised to incorporate those items agreed to at our October 31, 1991 meeting with the District or identified on preliminary drawings. The plans show pertinent features of the proposed adjacent District levee construction and mitigation area. We agree that the District may encroach slightly beyond the District right-of-way line. This encroachment is shown on the attached reduced plans of the project site. The purpose of this encroachment is to allow construction of a 2:1 fill slope with toe of slope rounding.

Caltrans acknowledges that the District will in the near future be reducing the elevation of the levee to 10.0 NVGD at Guadalupe Slough and 11.5 NVGD at Moffet Park Drive. Caltrans understands that this levee elevation will protect against salt water flooding but that events greater than a 10% exceedance frequency on Calabazas Creek may cause freshwater flooding on the site.

We understand that the District will continue to be responsible for maintenance of the flood control channel and levee. Caltrans will be responsible for the operation and maintenance of the culverts, pipes, catwalk, and all other features constructed under this mitigation project for the period of time that it takes to establish the wetlands and fulfill our mitigation responsibilities. The U.S. Fish and Wildlife Service is expected to accept the site from Caltrans for inclusion in the San Francisco Bay National Wildlife Refuge and take over operation and maintenance responsibilities after the establishment period of about 5 years.

- Advertise for construction bids: May 11 to June 9, 1992
- Award construction contract: July 7, 1992
- Construction: July 27 to November 2, 1992

Please call me or Gene Gonzalo, Project Engineer, at (408) 452-7339 if you have any questions regarding this matter. Thank you for your cooperation.

Sincerely,

PRESTON W. KELLEY
District Director

By MEWelsh
FOR HARRY Y. YAHATA
Deputy District Director
Project Development "A"
South Bay Counties

cc: Joel Maniaci - SCCTA
Gerald Comati - Bechtel
Ken Reiller - SCVWD
Cindy Potter - CH2MHill

ARMY CORPS OF ENGINEERS
SECTION 404 PERMIT

DEPARTMENT OF THE ARMY PERMIT

Permittee Santa Clara Valley Water District

Permit No. 16833S92

Issuing Office San Francisco District

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: The permittee is hereby authorized to place a total of 39,163 cubic yards of fill material within Corps jurisdiction for flood protection along 8 miles of Calabazas Creek from Guadalupe Slough to Miller Avenue as shown in the attached table. (See attached Table A.) As depicted in the attached drawing, the authorized fill is for the construction of raised levees, concrete linings under bridges, gabion slope protection, instream gabion and rock groins, temporary cofferdams, a bypass channel, additional culvert cells, new bridges, and depressed maintenance roads. The permittee is also authorized to redeposit fill material incidentally discharged into areas within Corps jurisdiction in association with the excavation of 97,000 cubic yards of earth and sediments from the channel and banks of Calabazas Creek.

All work shall be done in accordance with the attached tables and drawings entitled, "Proposed Channel Construction on Calabazas Creek in the cities of Santa Clara, Sunnyvale, and Curpertino in Santa Clara County, Application by: Santa Clara Valley Water District", in 7 sheets dated October 2, 1989.

Project Location: Calabazas Creek between Guadalupe Slough and Miller Avenue, Cities of Santa Clara, Sunnyvale, and Cupertino, County of Santa Clara, California.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on January 1, 1999. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

See attached pages 2A, 2B, and 2C.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

(X) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

SPECIAL CONDITION1S
SANTA CLARA VALLEY WATER DISTRICT
CALABAZAS CREEK FLOOD CONTROL PROJECT
PERMIT NO. 16833S92

A. Cultural Resources

1. The permittee shall revise the draft report entitled Evaluation of Prehistoric Resources for the Calabazas Creek Flood Control in accordance with comments provided to Ms. Rocelia Kmak of the Santa Clara Valley Water District and the results of the testing program identified below. The report shall be submitted to the Corps of Engineers (Attn: Richard Stradford) and the Northwest Information Center (Sonoma State University).

2. The permittee shall update the existing site record and site sketch map for CA-SCL-134 and submit to the Corps and the Northwest Information Center.

3. The permittee shall develop and implement a plan to achieve the following objectives for CA-SCL-134:

a. carry out a limited, focused testing program, using rapid-recovery excavation techniques, to attempt to identify the areas of archaeological integrity within the impact zone (only) that will subsequently be monitored during construction;

b. prepare a plan of monitoring procedures as appropriate and execute it at the areas identified as a result of the testing;

c. consult with local Indian representatives, and taking their views and the currently accepted scientific practices into consideration, prepare a treatment plan to be used in the event that human burials are discovered during construction; and

d. prepare a written report of the work conducted in accord with paragraph 3 herein, i.e., the testing-program methods and results, the monitoring procedures and results, and including any treatment plan that is implemented to recover human burials.

4. The permittee shall submit the above plans/records/reports in draft form, as they are completed, to the Corps for review and comment (Attn: Richard Stradford, Environmental Branch, Corps of Engineers, 211 Main treet, San Francisco, CA 94105-1905). The documents shall be revised based upon comments received and submitted in final form.

. Plans and Drawings

1. In addition to the original Public Notice drawings referenced in the roject description of this permit, the permittee shall carry out the uthorized work in accordance with the additional plans and drawings marked, "Calabazas Creek Flood Control Project Design Modifications, Permit No. 16833S92", in 7 sheets dated January 1, 1994.

C. Riparian and Brackish Marsh Mitigation and Monitoring Plans

1. The permittee shall carry out wetland mitigation for project related impacts to brackish marsh habitat in accordance with the "Calabazas Creek Brackish Marsh Habitat Mitigation and Monitoring Plan", prepared by H. T. Harvey and Associates, dated October 6, 1993.

2. The permittee shall carry out riparian habitat mitigation in accordance with the "Santa Clara Valley Water District Calabazas Creek Riparian Habitat Mitigation and Monitoring Plan", prepared by H. T. Harvey Associates, dated October 1992, and in accordance with the attached project design modifications plans intended to reduce riparian habitat impacts. In addition, the current planting list in the Riparian Mitigation Plan will be modified to include willows (Salix spp.) and California Blackberry (Rubus vitifolius).

3. The permittee shall incorporate the following modifications into the above referenced mitigation plans and/or the project EIR dated April 1992.

a. Modify the maintenance program for Reach 3A, as described on page 124 of the Calabazas Creek EIR dated April 1992, so that the area within 15 feet of the toe of the east slope will remain undisturbed.

b. The performance criteria for vegetation growing at the gabion planters at approximately 4 feet above the bed of the channel are as follows:

(i) establishment of a stable perennial rootstock or multiple stems of native woody riparian vegetation at the end of the first growing season in each planter,
(ii) by the end of the second growing season, establishment of multiple woody stems with foliar cover extending over at least 45 percent of half-circle area extending at least three feet from the base of the plant toward the channel,
(iii) transplants which fail to survive shall be replaced and actively maintained by irrigation and fertilization until at least 95 percent of all gabion planters next to the channel bed support woody riparian vegetation as in (ii) above.

c. The performance criterion for vegetation growing adjacent to the groins in natural sediment deposits are as follows:

(i) establishment of a stable perennial rootstock or multiple trunks of woody native riparian vegetation adjacent to at least 50 percent of all groins at the end of the first growing season, and
(ii) by the end of the second growing season establishment of woody riparian vegetation adjacent to 75 percent of all groins. (Note: This criterion maybe suspended following significant natural erosional events associated with infrequent high flows.)

d. In planter boxes where willows will be installed, the depth of the pilot root tubes will be increased to the depth at which groundwater is likely to occur. During the first growing season after the transplantation of woody native riparian vegetation in planters, planters shall be inspected by a qualified biologist or plant materials specialist, and watered and fertilized as needed to ensure high survivorship and secure establishment.

e. Each year for 5 years after project completion, a minimum of 15 randomly sampled gabion planters within approximately 4' of the channel bed, and a minimum of 15 randomly sampled sites downstream and adjacent to the groins shall be sampled for: (i) the data required to determine performance criteria cited in (b) and (c) above; (ii) plant species present; and (iii) approximate areal projected canopy cover of the dominant woody species. Each site shall be photographed from a constant position and orientation on the gabion bank above the vegetated areas. The results shall be analyzed and summarized in an annual report to be submitted each year to the Corps.

f. The Riparian Mitigation and Monitoring Plan for Reaches 1 through 8 will be modified to provide that the final success criteria will not be considered to have been met until at least two years following the last human intervention (ie. irrigation and replanting).

g. In reference to the April 1992 EIR, Appendix U, page 10, the permittee shall not undertake construction until a soil boring program testing for contaminated groundwater and soil has been implemented and all required approvals or authorizations from State and Federal agencies have been obtained.

h. Maintenance practices for management of the riparian vegetation growing in the vicinity of the gabion-groin structures in reaches 1-8 shall be modified so that native woody vegetation shall be removed by mowing when the height of the tallest vegetation exceeds 4 feet above the substrate. Vegetation shall be controlled such that regeneration from an established rootstock or trunk may occur.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

P. Kay Whitlock — Feb 1, 1994

(PERMITTEE) *(DATE)*

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

7 Feb 94

(DISTRICT ENGINEER) *(DATE)*

LEONARD E. CARDOZA
LTC, EN

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEREE) *(DATE)*

☆U S GOVERNMENT PRINTING OFFICE 1986 — 717-425

A VALLEY
DISTRICT

94 JAN 24 A11 : 04

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

No. 5193

State of California
County of Santa Clara

On 2/1/94 before me, Susan L. Turner, Notary Public,
DATE — NAME, TITLE OF OFFICER - E.G., "JANE DOE, NOTARY PUBLIC"

personally appeared P. Kay Whitlock,
NAME(S) OF SIGNER(S)

☒ personally known to me - **OR** - ☐ proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

SUSAN L. TURNER
COMM. #970004
NOTARY PUBLIC-CALIFORNIA
SANTA CLARA COUNTY
My Comm. Expires Jul. 27, 1996

WITNESS my hand and official seal.

Susan L. Turner
SIGNATURE OF NOTARY

OPTIONAL SECTION

CAPACITY CLAIMED BY SIGNER

Though statute does not require the Notary to fill in the data below, doing so may prove invaluable to persons relying on the document.

☐ INDIVIDUAL
☐ CORPORATE OFFICER(S)
TITLE(S)
☐ PARTNER(S) ☐ LIMITED ☐ GENERAL
☐ ATTORNEY-IN-FACT
☐ TRUSTEE(S)
☐ GUARDIAN/CONSERVATOR
☒ OTHER: Flood Control Manager

SIGNER IS REPRESENTING:
NAME OF PERSON(S) OR ENTITY(IES)
Santa Clara Valley Water District

OPTIONAL SECTION

THIS CERTIFICATE MUST BE ATTACHED TO THE DOCUMENT DESCRIBED AT RIGHT:

Though the data requested here is not required by law, it could prevent fraudulent reattachment of this form.

TITLE OR TYPE OF DOCUMENT Dept. of the Army Permit
NUMBER OF PAGES 21 DATE OF DOCUMENT 2/1/94
SIGNER(S) OTHER THAN NAMED ABOVE Leonard E. Cardoza

©1992 NATIONAL NOTARY ASSOCIATION • 8236 Remmet Ave., P.O. Box 7184 • Canoga Park, CA 91309-7184

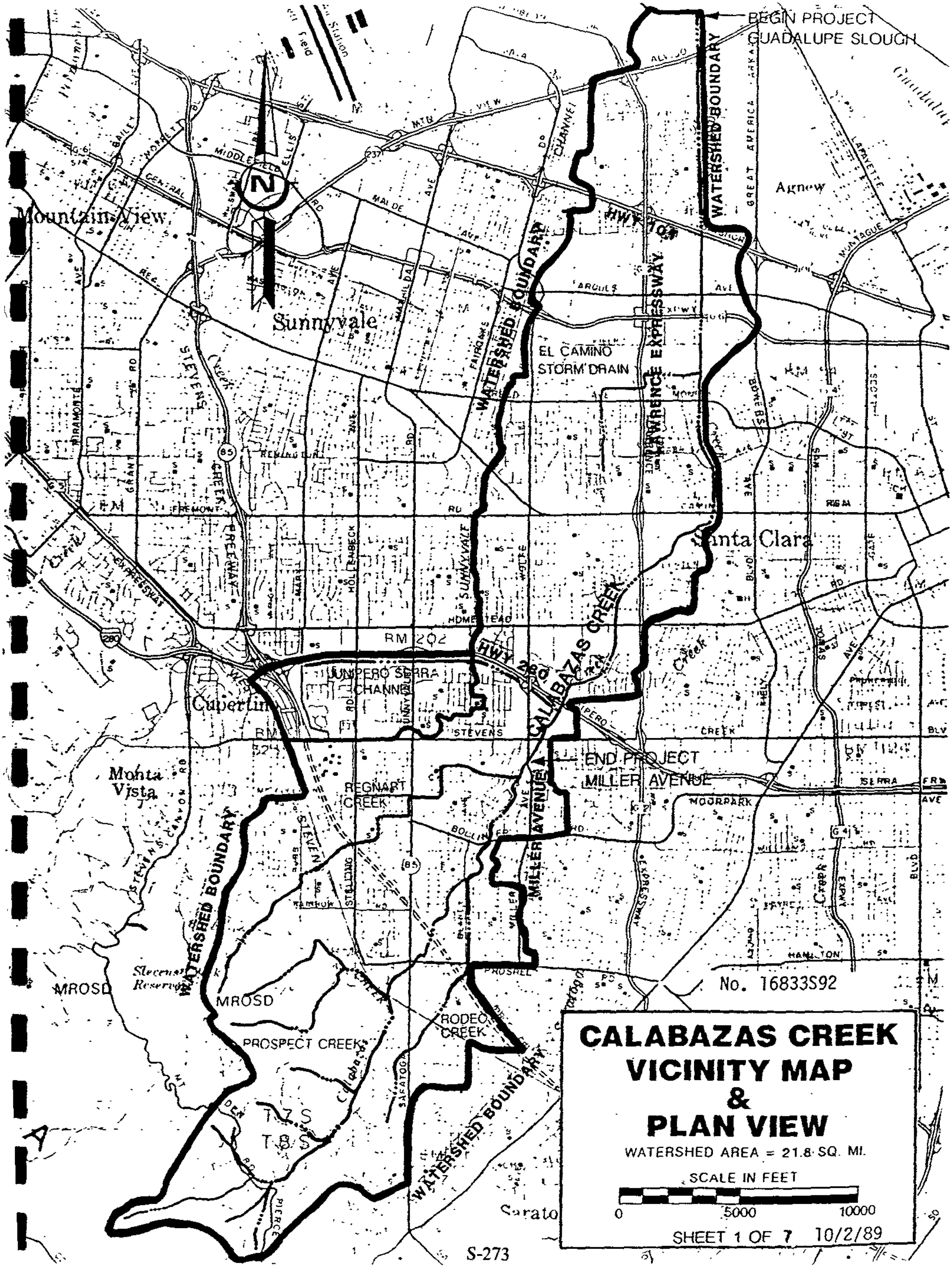
Table A.
Breakdown of fill volumes for Calabazas Creek Permit No. 16833S92.

Project Reaches 1-8 (Lawrence Expressway to Miller Avenue):
a. 3,098 cubic yards of concrete,
b. 9,101 cubic yards of gabions,
c. 2,321 cubic yards of rock,
d. 2,033 cubic yards of earth fill for cofferdams,
f. 2,720 cubic yards of permanent earth fill,
g. 1,321 cubic yards of gabion groins.

Total authorized fill volume for Reaches 1-8: 20,594 cubic yards.

Project Reaches 9-12 (Guadalupe Slough to Highway 101):
a. 815 cubic yards of concrete,
b. 3,050 cubic yards of earth fill for cofferdams,
c. 14,704 cubic yards of permanent earth fill.

Total authorized fill volume for Reaches 9-12: 18,569 cubic yards.



No. 16833S92

CALABAZAS CREEK VICINITY MAP & PLAN VIEW

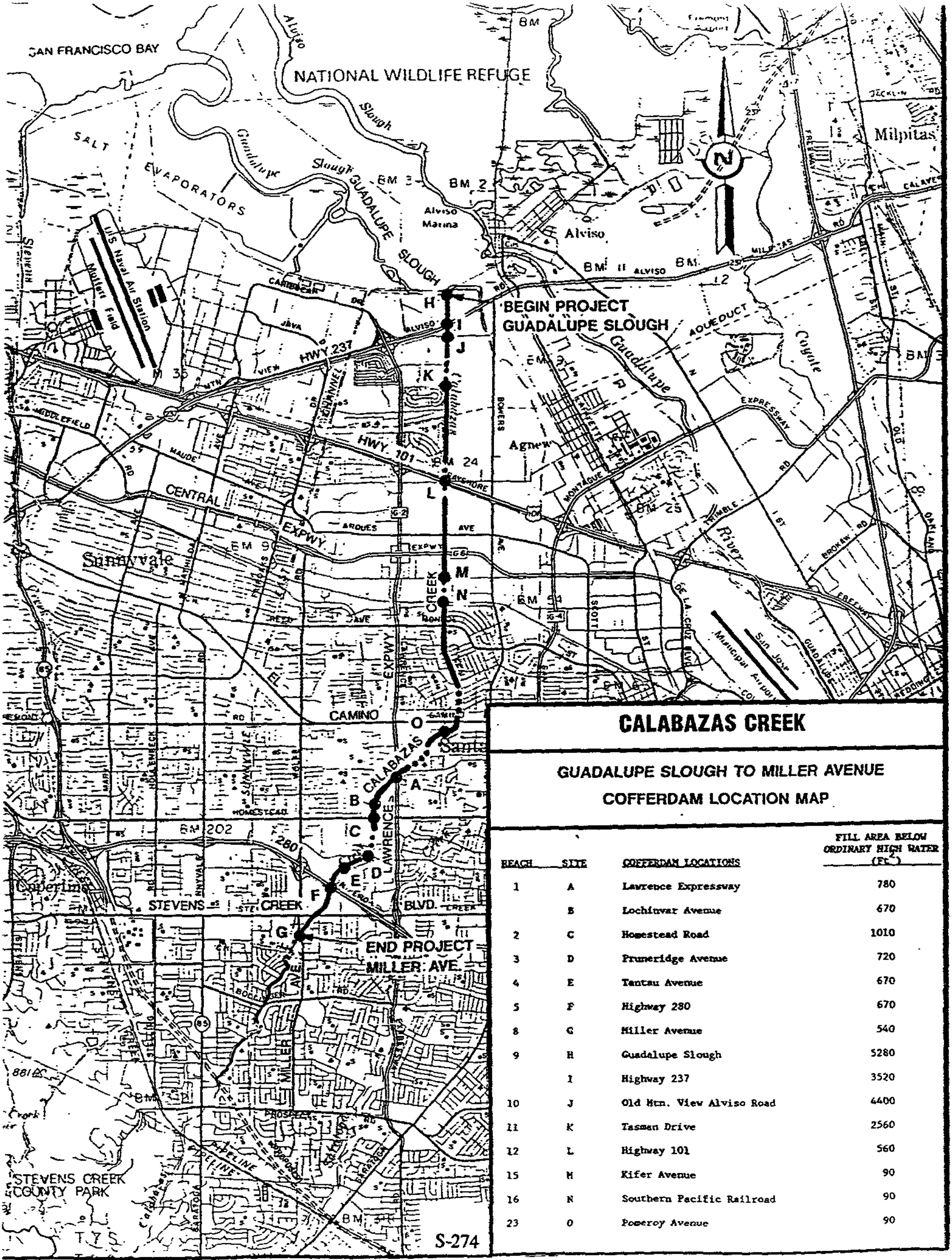
WATERSHED AREA = 21.8 SQ. MI.

SCALE IN FEET

0 5000 10000

SHEET 1 OF 7 10/2/89

S-273



CALABAZAS CREEK

GUADALUPE SLOUGH TO MILLER AVENUE
COFFERDAM LOCATION MAP

REACH	SITE	COFFERDAM LOCATIONS	FILL AREA BELOW ORDINARY HIGH WATER (Ft^2)
1	A	Lawrence Expressway	780
	B	Lochinvar Avenue	670
2	C	Homestead Road	1010
3	D	Pruneridge Avenue	720
4	E	Tantau Avenue	670
5	F	Highway 280	670
8	G	Miller Avenue	540
9	H	Guadalupe Slough	5280
	I	Highway 237	3520
10	J	Old Mtn. View Alviso Road	4400
11	K	Tasman Drive	2560
12	L	Highway 101	560
15	M	Kifer Avenue	90
16	N	Southern Pacific Railroad	90
23	O	Pomeroy Avenue	90

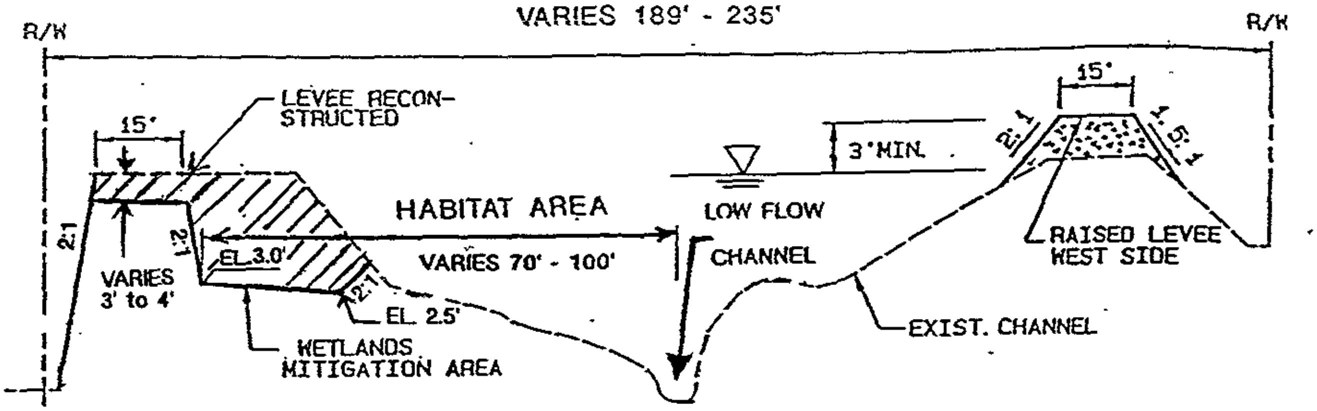


FIGURE 1A

GUADALUPE SLOUGH TO HIGHWAY 237

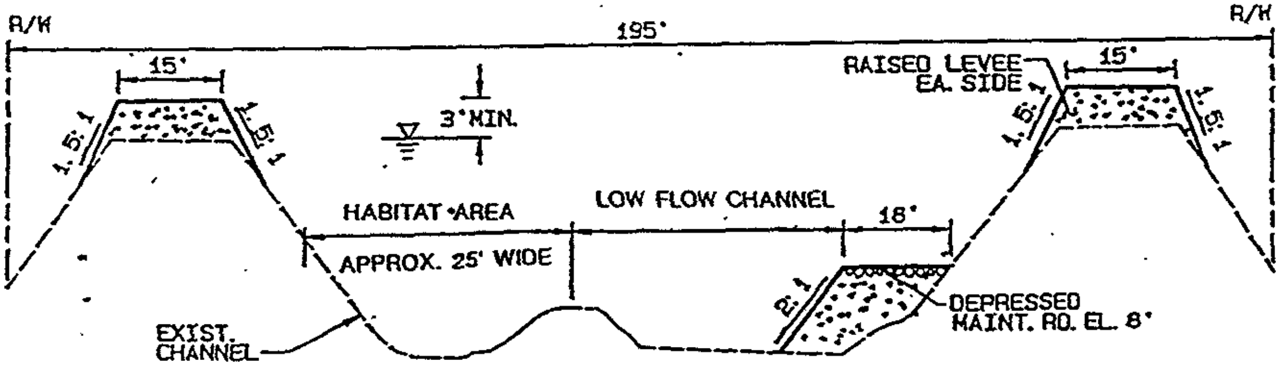


FIGURE 1B
HIGHWAY 237 TO
OLD MOUNTAIN VIEW - ALVISO ROAD

LEGEND

░ FILL

▨ EXCAVATION

NOT TO SCALE

PROPOSED CHANNEL CONSTRUCTION ON
CALABAZAS CREEK IN THE CITIES OF
SANTA CLARA, SUNNYVALE & CUPERTINO
IN SANTA CLARA COUNTY. APPLICATION BY
SANTA CLARA VALLEY WATER DISTRICT.

NOTES

1. Elevation Datum N.G.V.D. 1929 Adjusted 1976.
2. Channel Invert Elevation Varies From -4 To 187
3. All Cross Sections Are Shown Looking Upstream.
4. Total Excavation = 65,000 C.Y.
   Total Fill = 5,500 C.Y.

SHEET 3 OF 7 S-275 11/30/93 REV.

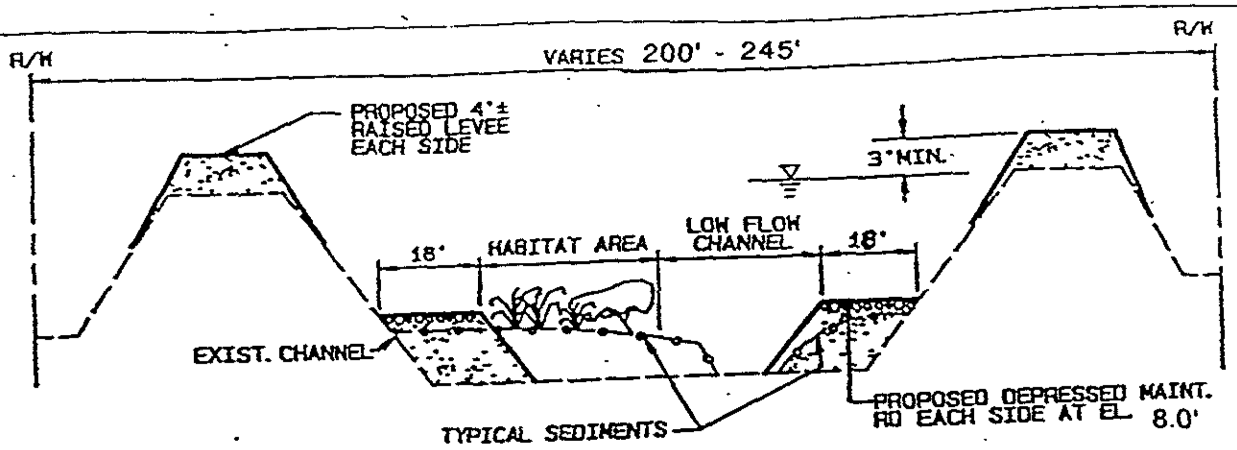


FIGURE 1C

OLD MOUNTAIN VIEW- ALVISO ROAD TO TASMAN DRIVE

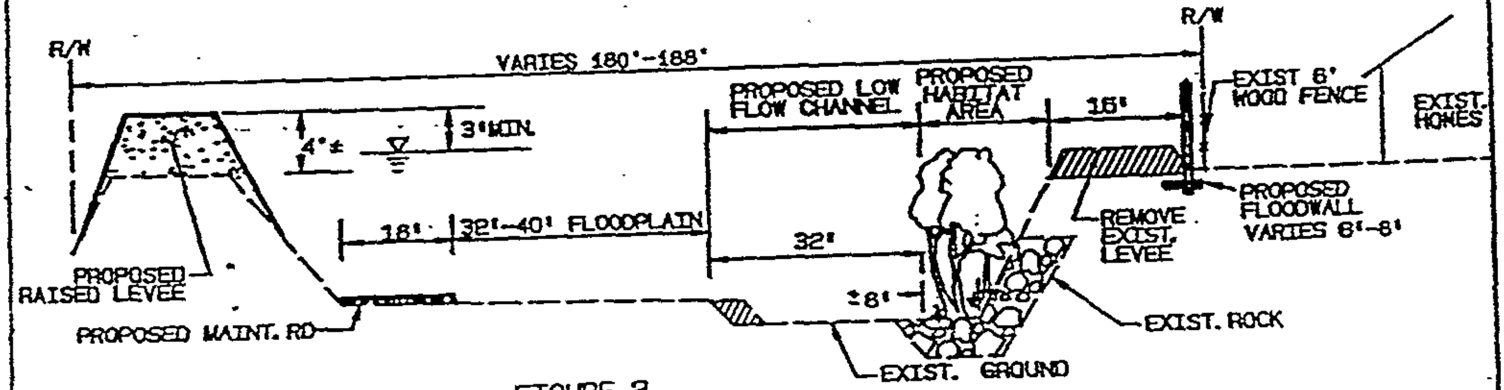


FIGURE 2

TASMAN DRIVE TO MISSION COLLEGE

LEGEND

▨ FILL

▧ EXCAVATION

NOT TO SCALE

PROPOSED CHANNEL CONSTRUCTION ON
CALABAZAS CREEK IN THE CITIES OF
SANTA CLARA, SUNNYVALE & CUPERTINO
IN SANTA CLARA COUNTY. APPLICATION BY
SANTA CLARA VALLEY WATER DISTRICT.

NOTES

1. Elevation Datum N.G.V.D. 1929 Adjusted 1976.
2. Channel Invert Elevation Varies From -4 To 167
3. All Cross Sections Are Shown Looking Upstream.
4. Total Excavation = 65,000 C.Y.
   Total Fill = 5,500 C.Y.

SHEET 4 OF 7 S-276 11/30/93 REV.

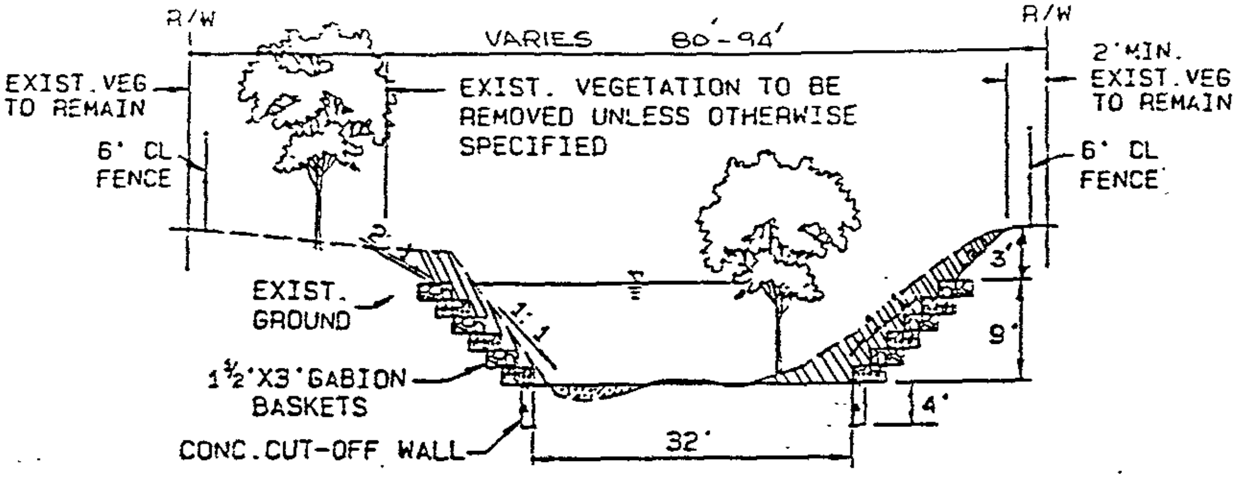


FIGURE 3

STEPPED GABION LINED CHANNEL

1. Lawrence Expressway to 600' upstream
2. 210' upstream of Lochinvar Ave. to Homestead Road
3. Tantau Avenue to I-280
4. Stevens Creek Blvd. to Miller Avenue

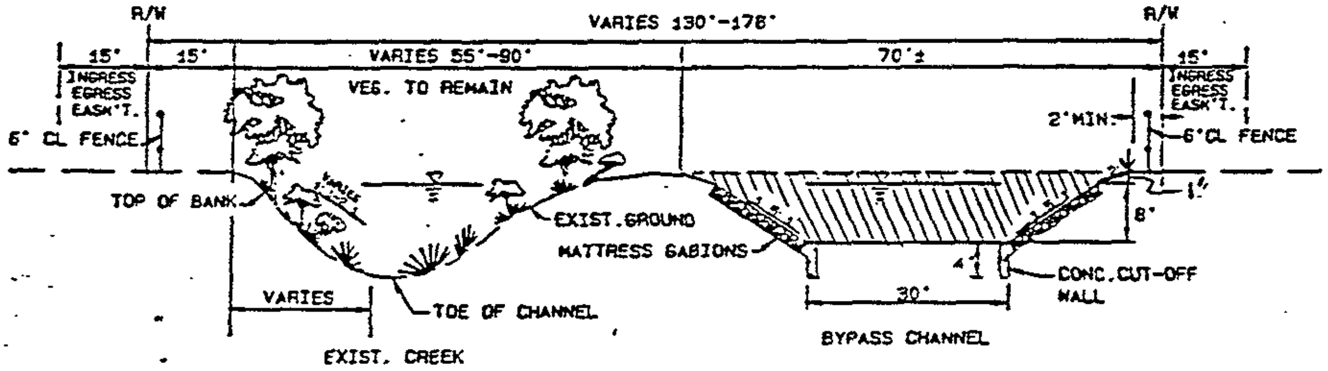


FIGURE 4

MATTRESS GABION BYPASS CHANNEL

1. 425' upstream Lawrence Express. to 1375' upstream of Lawrence Express.

LEGEND

░ FILL

▨ EXCAVATION

NOT TO SCALE

PROPOSED CHANNEL CONSTRUCTION ON
CALABAZAS CREEK IN THE CITIES OF
SANTA CLARA, SUNNYVALE & CUPERTINO
IN SANTA CLARA COUNTY. APPLICATION BY
SANTA CLARA VALLEY WATER DISTRICT.

NOTES

1. Elevation Datum N.G.V.D. 1929 Adjusted 1976.
2. Channel Invert Elevation Varies From -4 To 187
3. All Cross Sections Are Shown Looking Upstream.
4. Total Excavation = 65,000 C.Y.
   Total Fill = 5,500 C.Y.

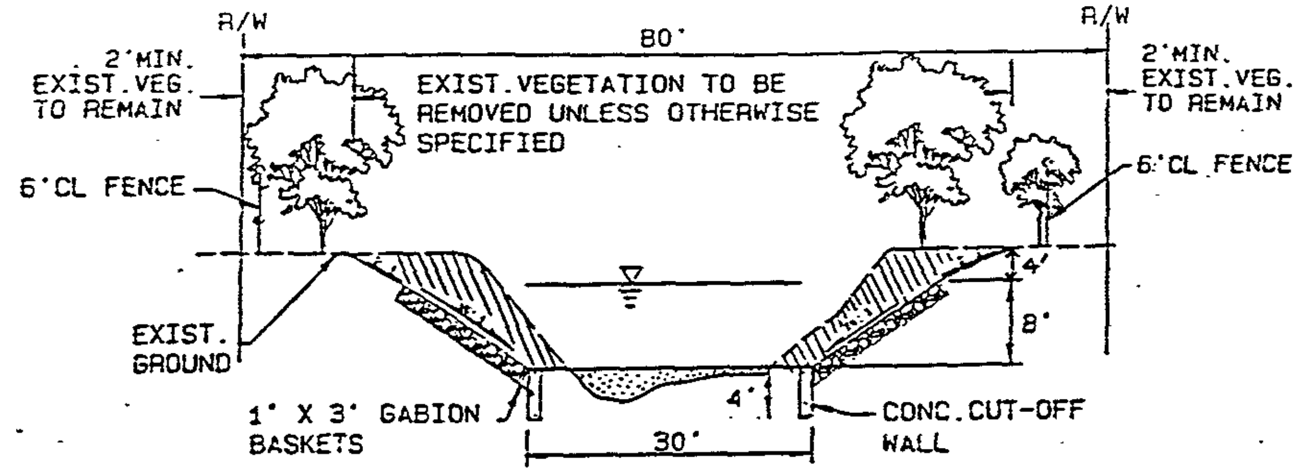


FIGURE 5

MATTRESS GABION LINED CHANNEL

1. 1375' upstream Lawrence Express. to 210' upstream of Lochinvar Ave.

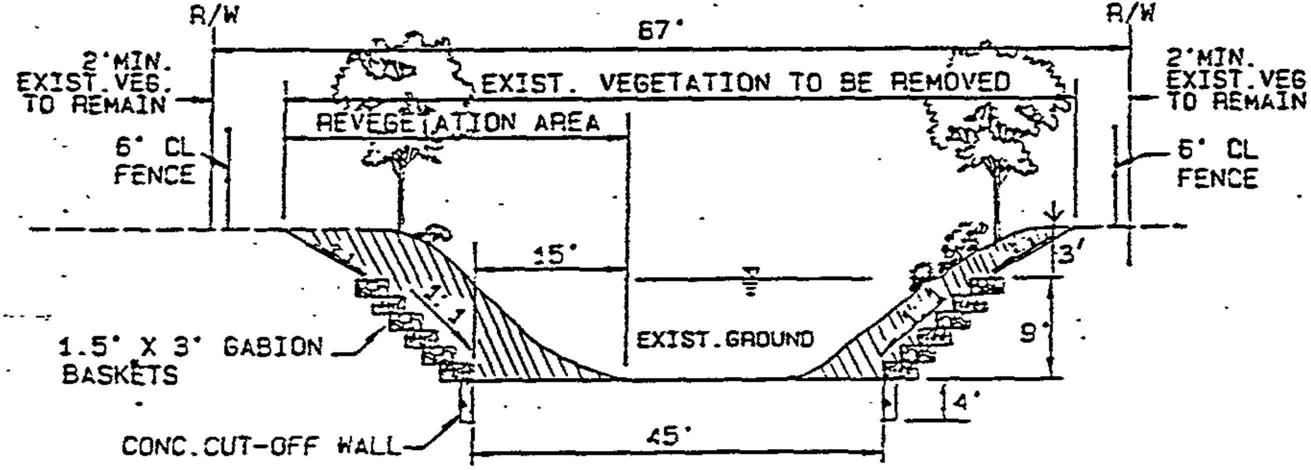


FIGURE 6

WIDENED STEPPED GABION LINED CHANNEL

1. Homestead Road to 1365' upstream

LEGEND

░ FILL

▨ EXCAVATION

NOT TO SCALE

PROPOSED CHANNEL CONSTRUCTION ON
CALABAZAS CREEK IN THE CITIES OF
SANTA CLARA,SUNNYVALE & CUPERTINO
IN SANTA CLARA COUNTY.APPLICATION BY
SANTA CLARA VALLEY WATER DISTRICT.

NOTES

1. Elevation Datum N.G.V.D. 1929 Adjusted 1976.
2. Channel Invert Elevation Varies From -4 To 187
3. All Cross Sections Are Shown Looking Upstream.
4. Total Excavation = 65,000 C.Y.
Total Fill = 5,500 C.Y.

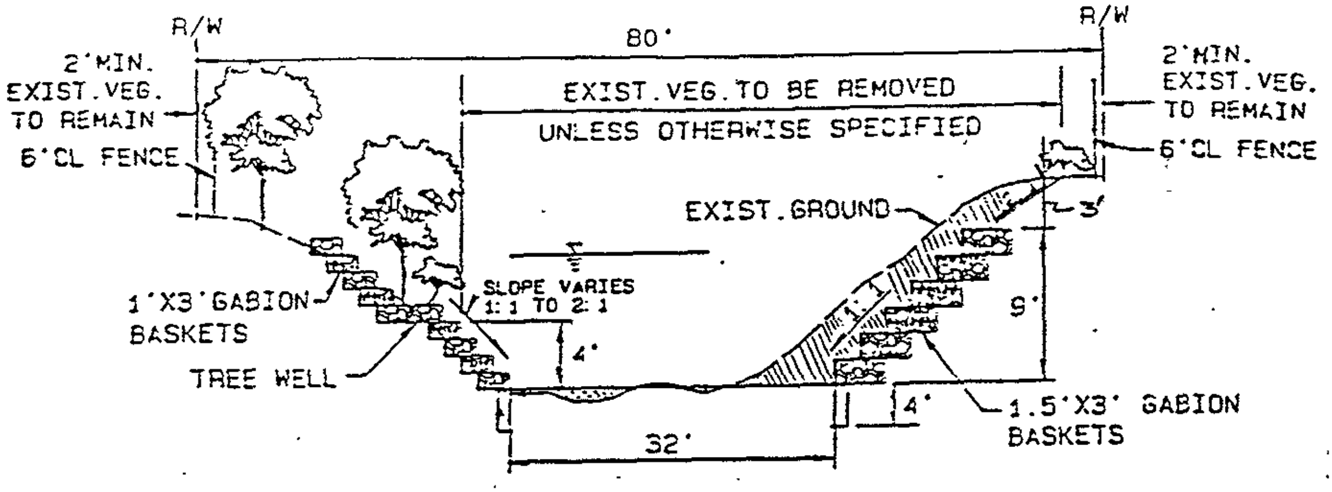


FIGURE 7

VARIABLE SLOPE STEPPED GABION LINED CHANNEL

1. 1365' upstream of Homestead Road
   to Tantau Ave.

LEGEND

░ FILL

▨ EXCAVATION

NOT TO SCALE

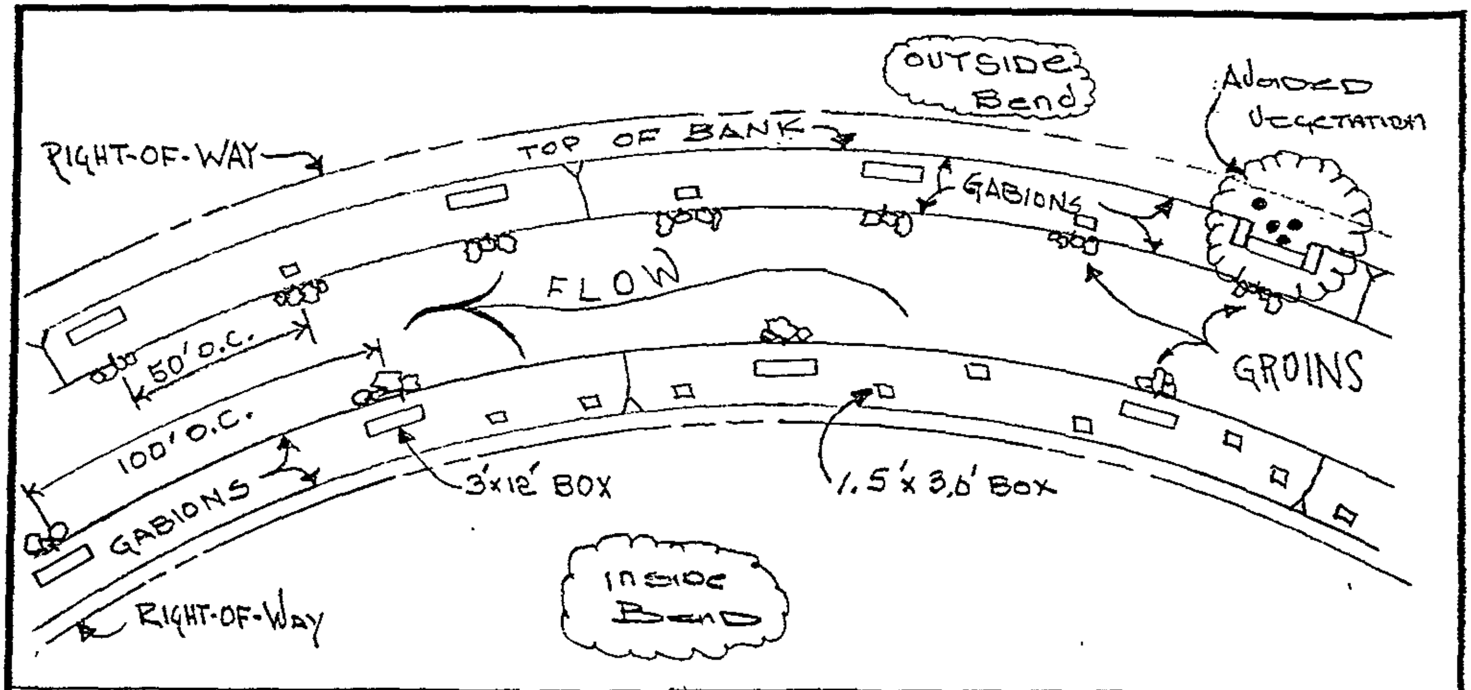
PROPOSED CHANNEL CONSTRUCTION ON
CALABAZAS CREEK IN THE CITIES OF
SANTA CLARA, SUNNYVALE & CUPERTINO
IN SANTA CLARA COUNTY. APPLICATION BY
SANTA CLARA VALLEY WATER DISTRICT.

NOTES

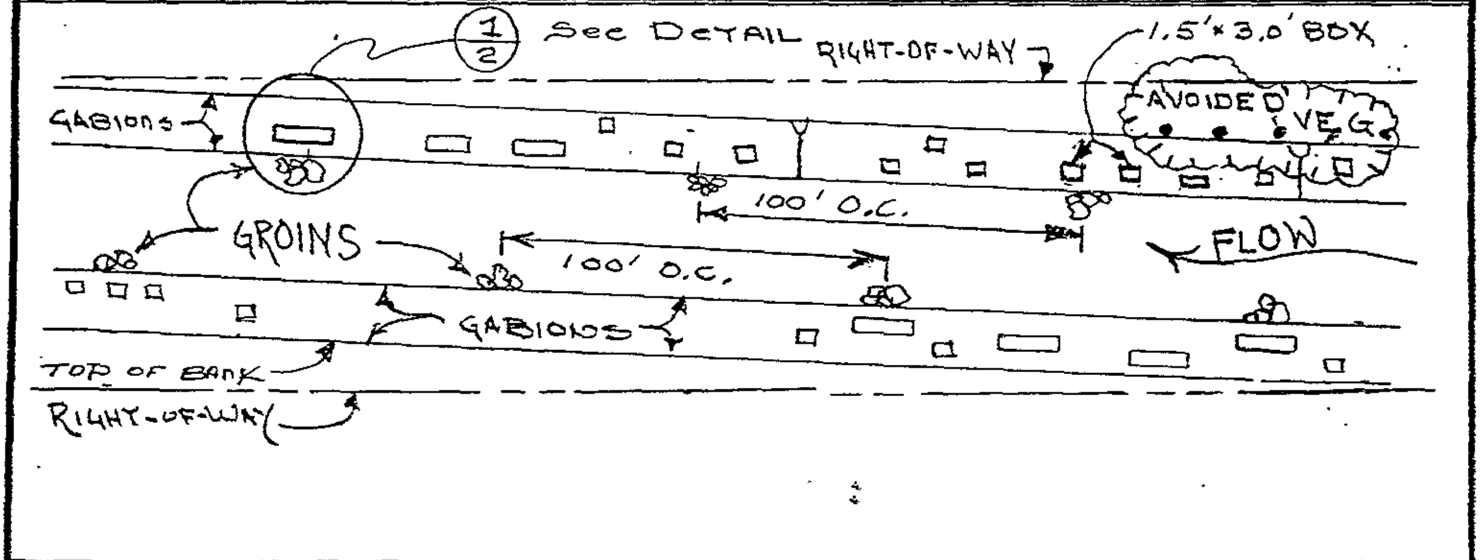
1. Elevation Datum N.G.V.D. 1929 Adjusted 1976.
2. Channel Invert Elevation Varies From -4 To 187
3. All Cross Sections Are Shown Looking Upstream.
4. Total Excavation = 65,000 C.Y.
   Total Fill = 5,500 C.Y.

SHEET 7 OF 7 S-279 10/2/89

Calabazas Creek Flood Control Project Design Modifications
Permit No. 16833S92, Date: January 1, 1994
Sheet 1

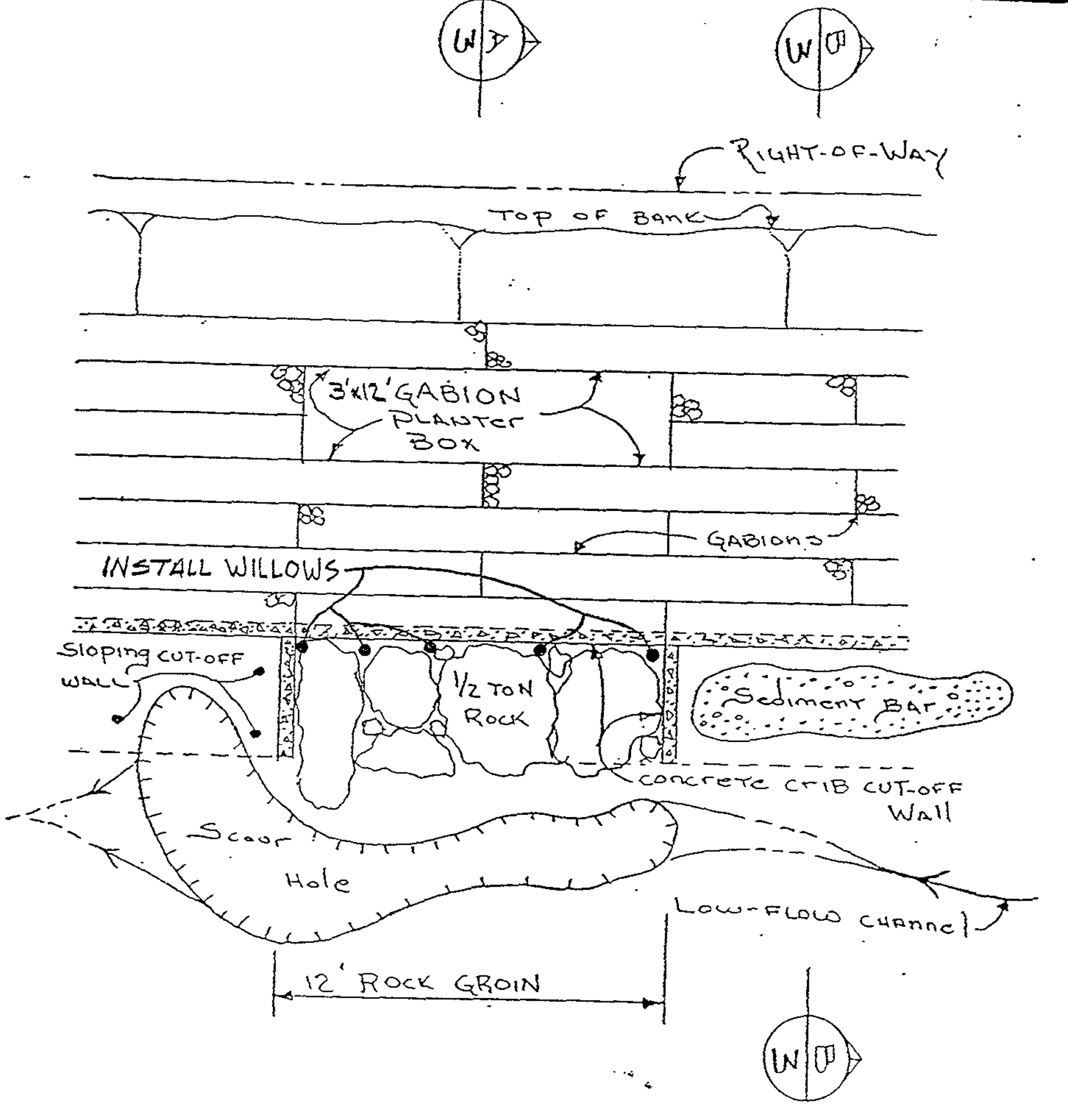


CURVED REACH (ABOVE)	GROIN ~ SPACING ~	STRAIGHT REACH (Below)
1. 50 FT. ON CENTER ON OUTSIDE Bend. 2. 100 FT. ON CENTER STAGGERED ON INSIDE Bend.	0 50 100 Scale: 1" = 50 FT.	1. STAGGER EACH SIDE AT 100 FT. ON CENTER.



1. BOTH 3'x12' AND 15'x3.0' BOXES TO be INTEGRATED WITH AVOIDED VEGETATION AND GROINS TO ACHIEVE HIGHEST ECOLOGICAL VALUE.	PLANTER BOX ~ SPACING ~	CALABASAS CREEK SANTA CLARA COUNTY CALIF. LAWRENCE EXPY. TO Miller AVE. S.C.V.W.D AUG. 1993 S-280
	0 50 100 Scale: 1" = 50 FT.	

Calabazas Creek Flood Control Project Design Modifications
Permit No. 16833S92, Date: January 1, 1994
Sheet 2

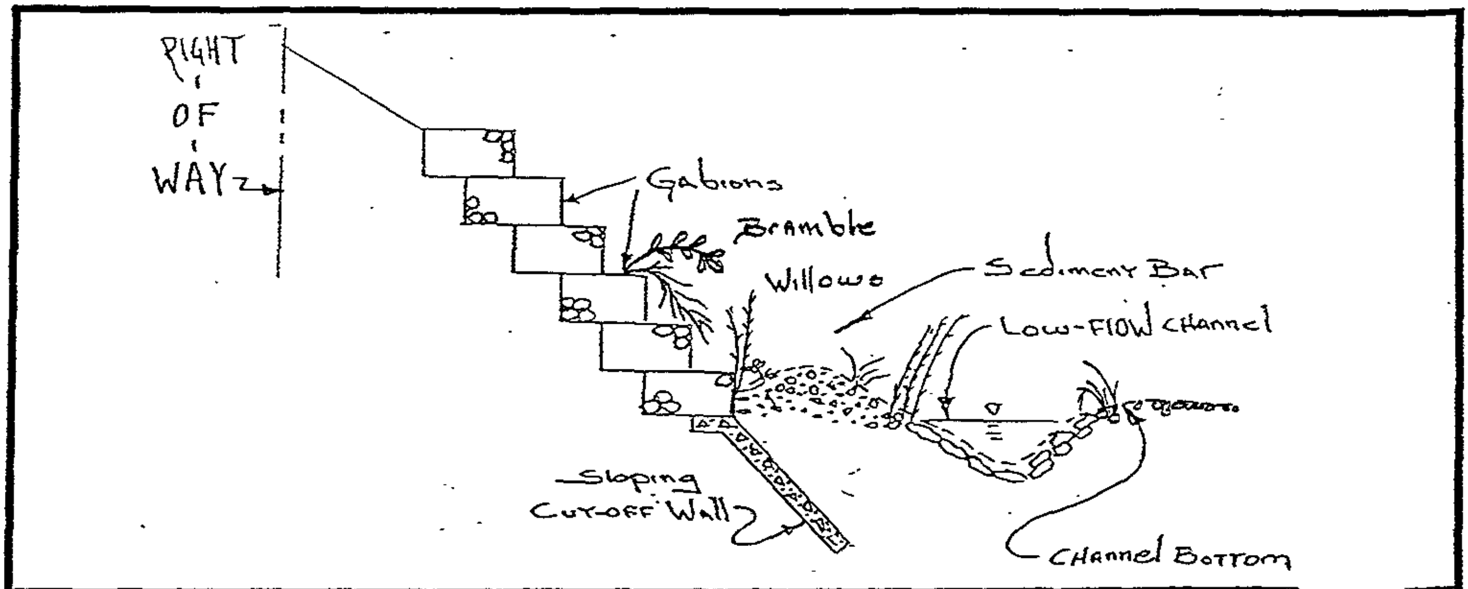


PURPOSE; 1. GROIN TO encourage GEOMORHIC Repsonce OF LOW-FLOW CHANNEL AND Sediment BAR FORM. 2. GABION FOUNDATION.	1/2 GROIN~PLANTER BOX ~DETAIL~ 0 5 10 Scale: 1" = 5 FT.	CALABAZAS CREEK SANTA CLARA CO. CALIF. LAWRENCE EXPWY. TO MILLER AVE. S.C.V.W.D. AUG. 1993 S-281

FC 807 (10-21-92)

printed on recycled paper

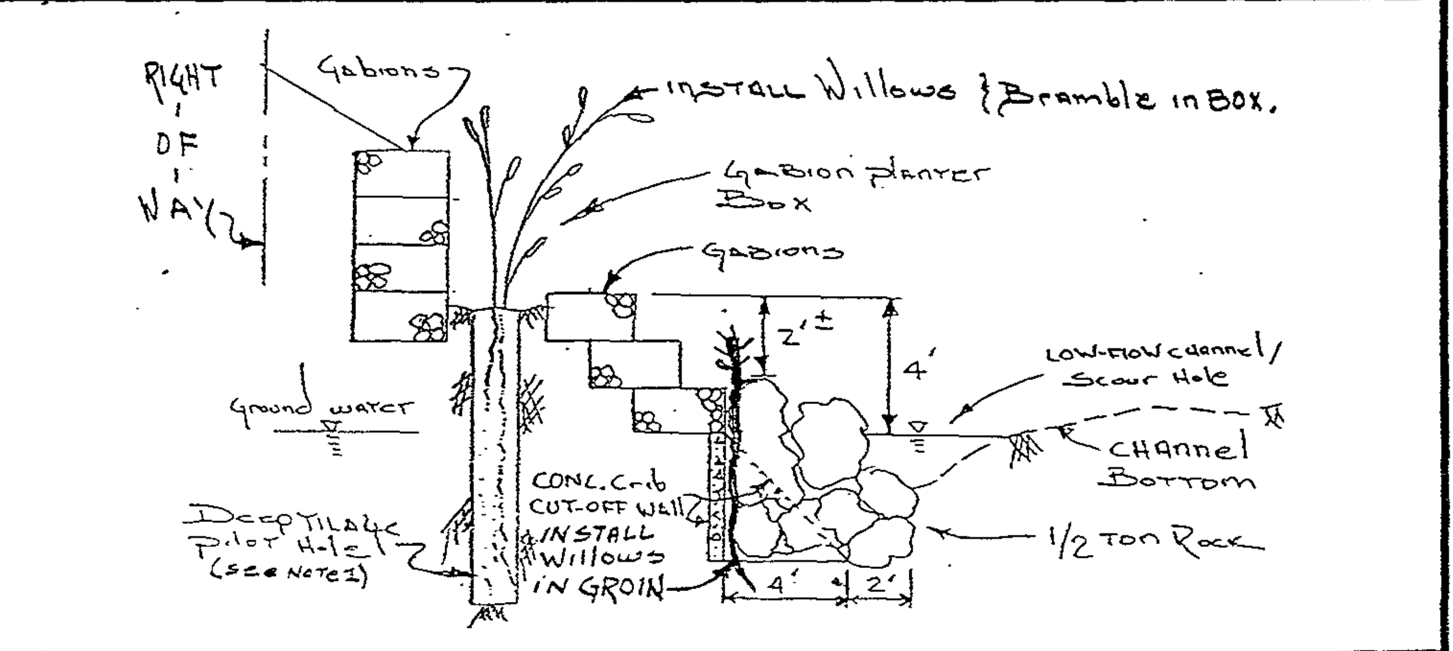
Calabazas Creek Flood Control Project Design Modifications
Permit No. 16833S92, Date: January 1, 1994
Sheet 3



LOW FLOW CHANNEL VARIES IN SHAPE AND LOCATION WITHIN CHANNEL BOTTOM. CULVERT LOW FLOW CHANNELS AND ACCESS RAMPS SITUATED ACCORD.

B/3 LOW-FLOW-CHANNEL SEDIMENT-BAR CROSS-SECTION
NOT TO SCALE

COMBINATIONS OF VEGETATION, SEDIMENT, AND LOCATION WITHIN THE CHANNEL BOTTOM MAY CREATE SNAGS AND OR EXCEED FLOOD CONTROL MAINTENANCE LIMITS.



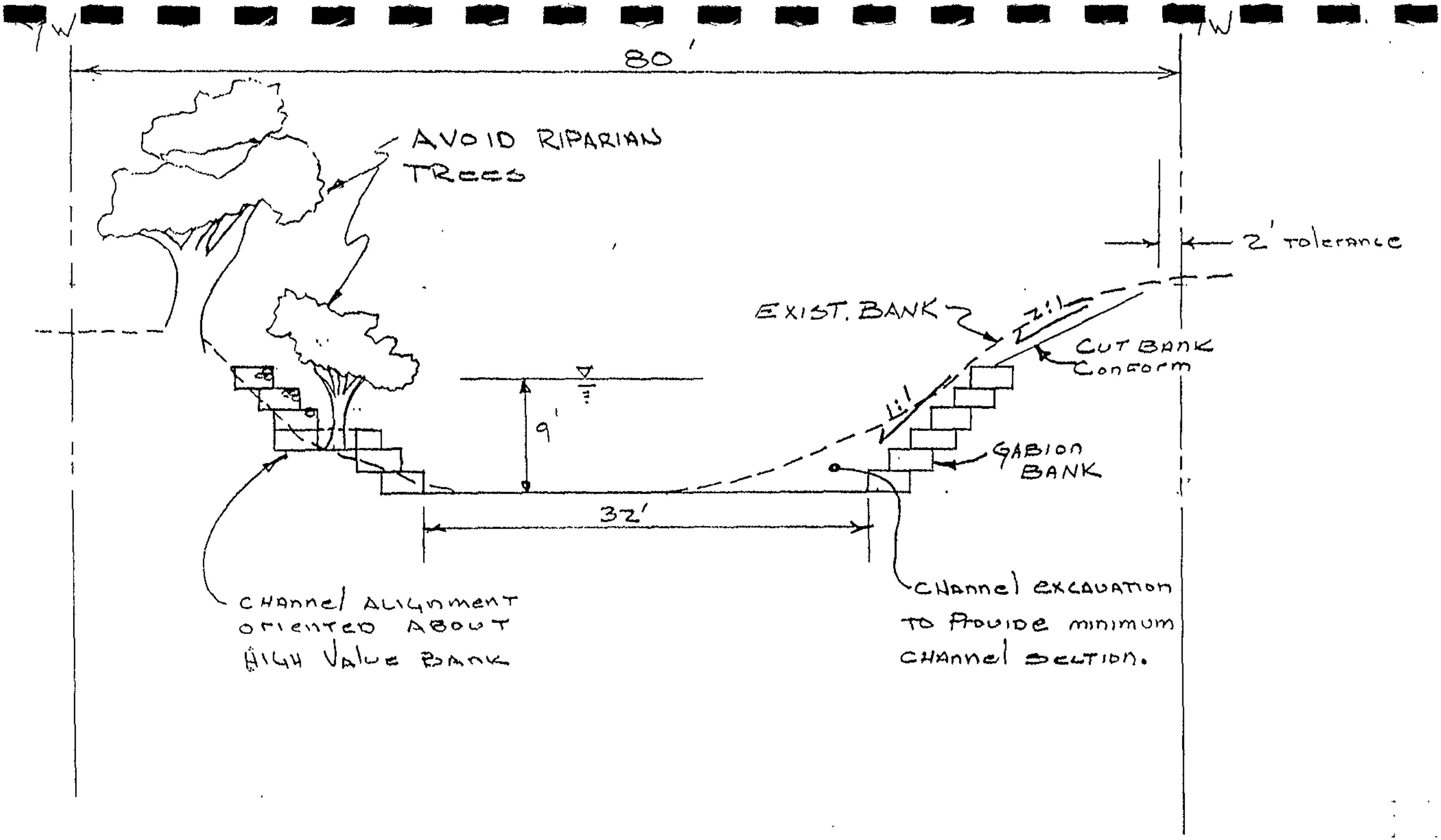
NOTE:
1. Planter Box to utilize Pilot Hole; Drilled 10 FT. Deep, or to Low Ground Water elev. which ever is Greater; for hydrophytic planting stock.

A/3 GROIN-PLANTER BOX CROSS-SECTION
~NOT TO SCALE~

CALABAZAS CREEK
SANTA CLARA CO. CALIFORNIA
LAWRENCE EXPWY. TO MILLER AVE.
S.C.V.W.D.
AUG. 1993
S-282

FC 807 (10-21-92)

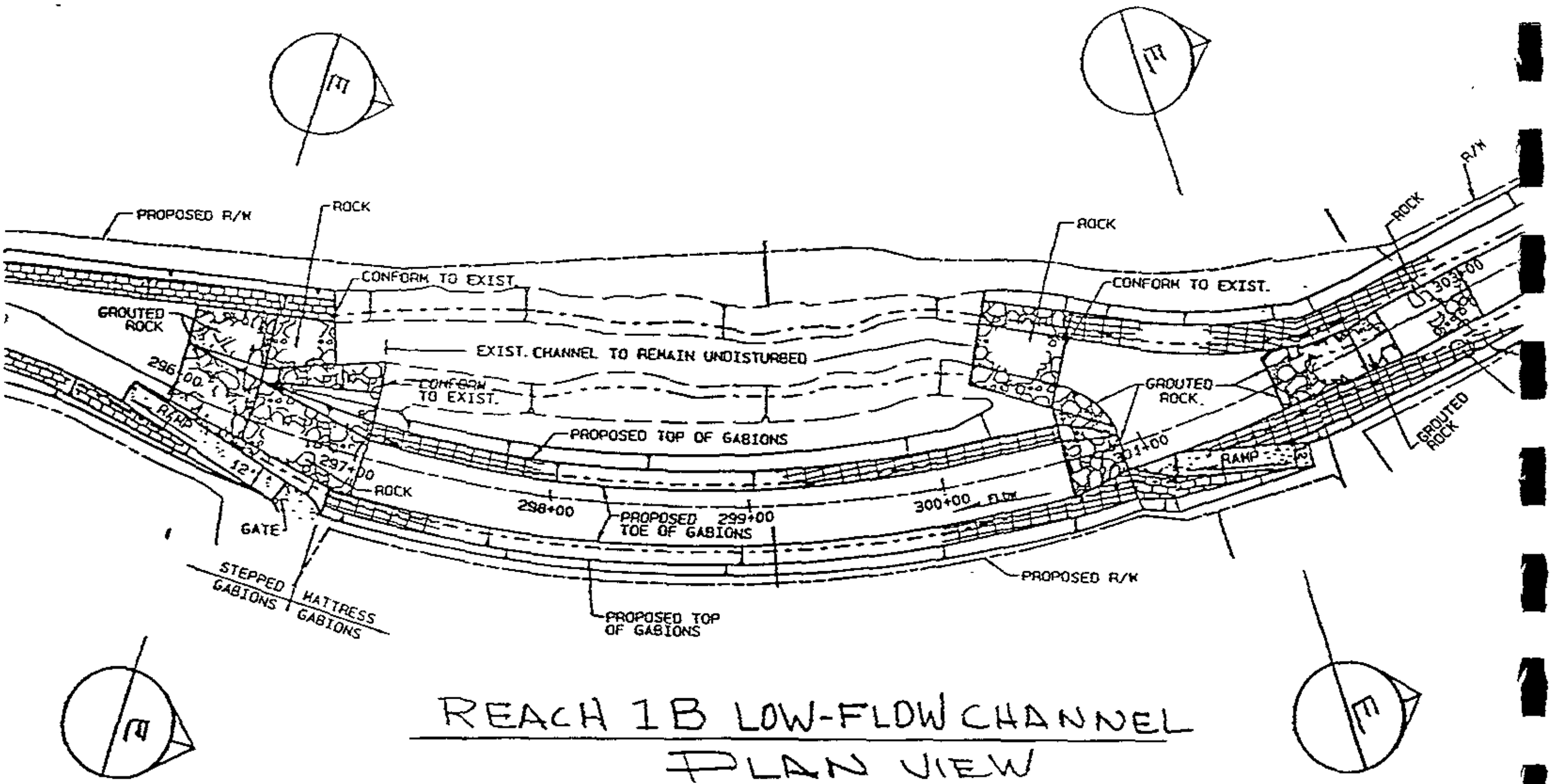
printed on recycled paper


TW
TW
80'
AVOID RIPARIAN TREES
2' tolerance
EXIST. BANK
2:1
CUT BANK CONFORM
1:1
9'
GABION BANK
32'
CHANNEL ALIGNMENT ORIENTED ABOUT HIGH VALUE BANK
CHANNEL EXCAVATION TO PROVIDE MINIMUM CHANNEL SECTION.

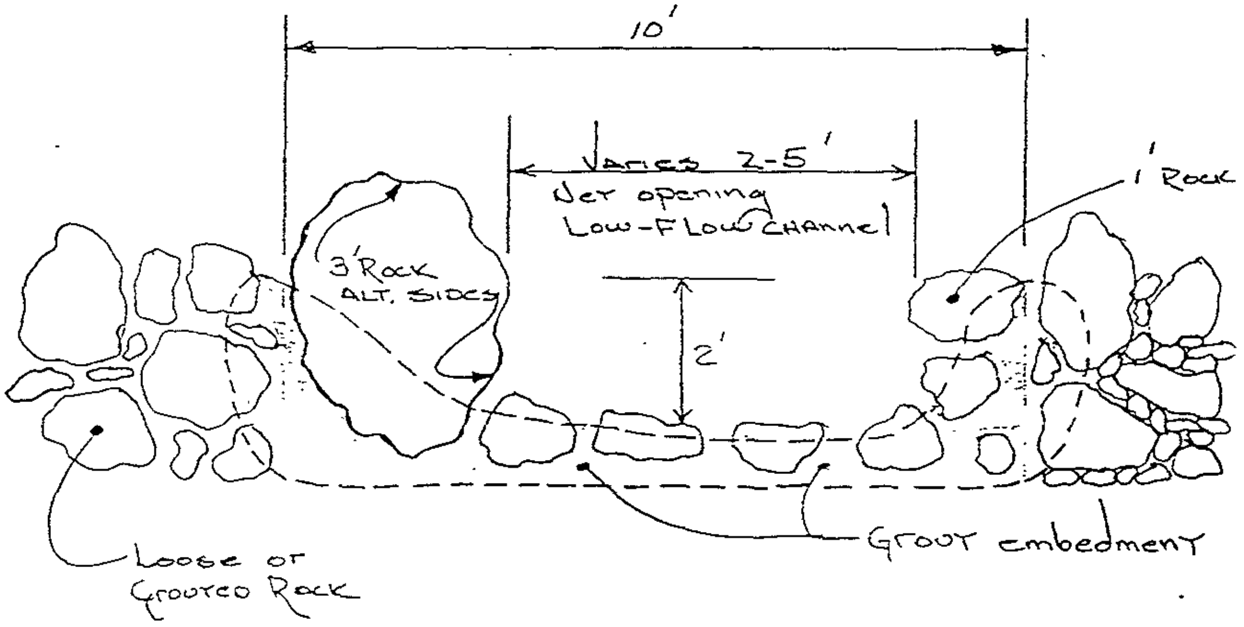
GABION LINED
TYPICAL CHANNEL SECTION

Scale: 1" = 10'

Calabazas Creek Flood Control Project Design Modifications
Permit No. 16833S92, Date: January 1, 1994
Sheet 4



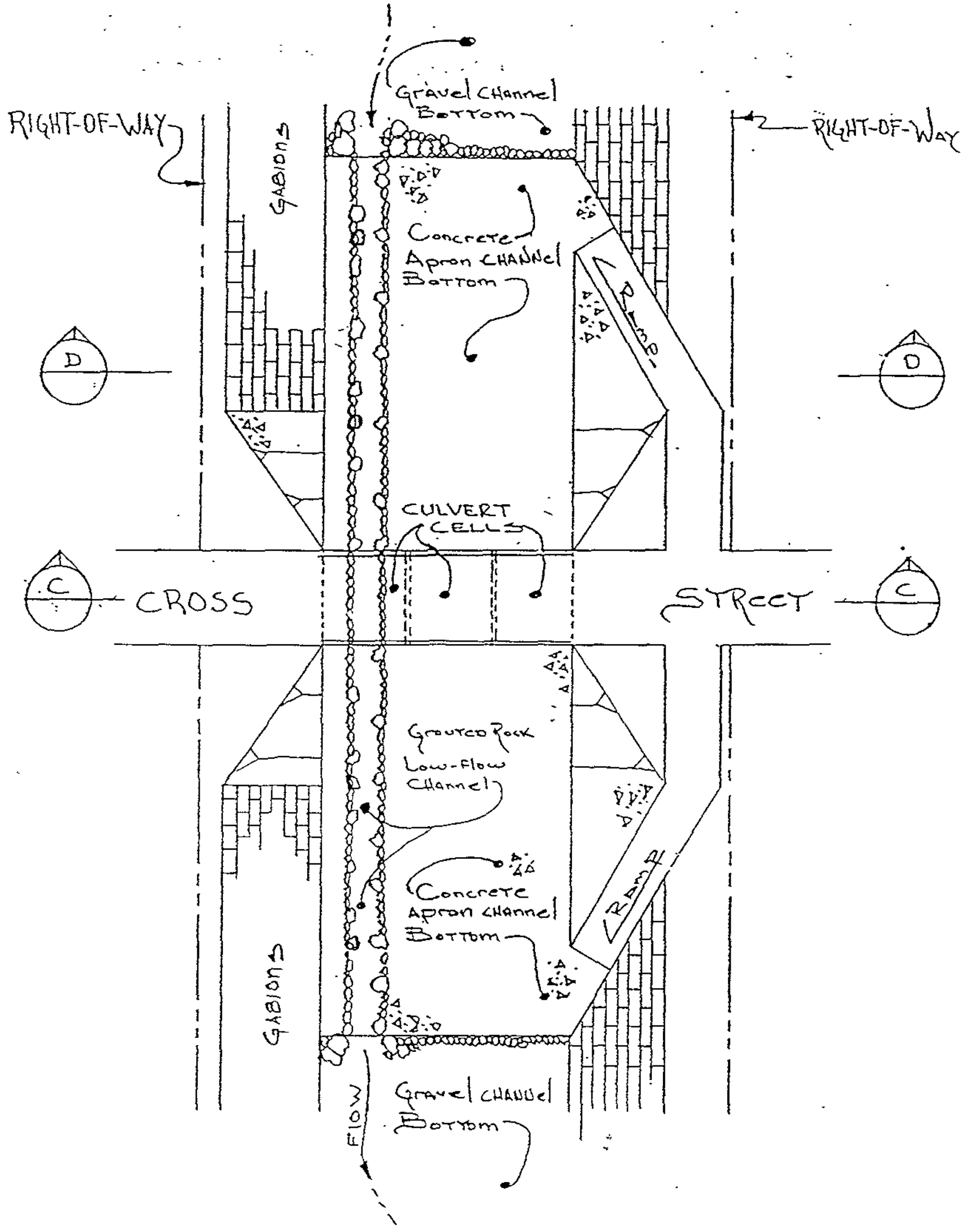
REACH 1B LOW-FLOW CHANNEL
PLAN VIEW



E GROUTED ROCK LOW-FLOW CHANNEL
SECTION

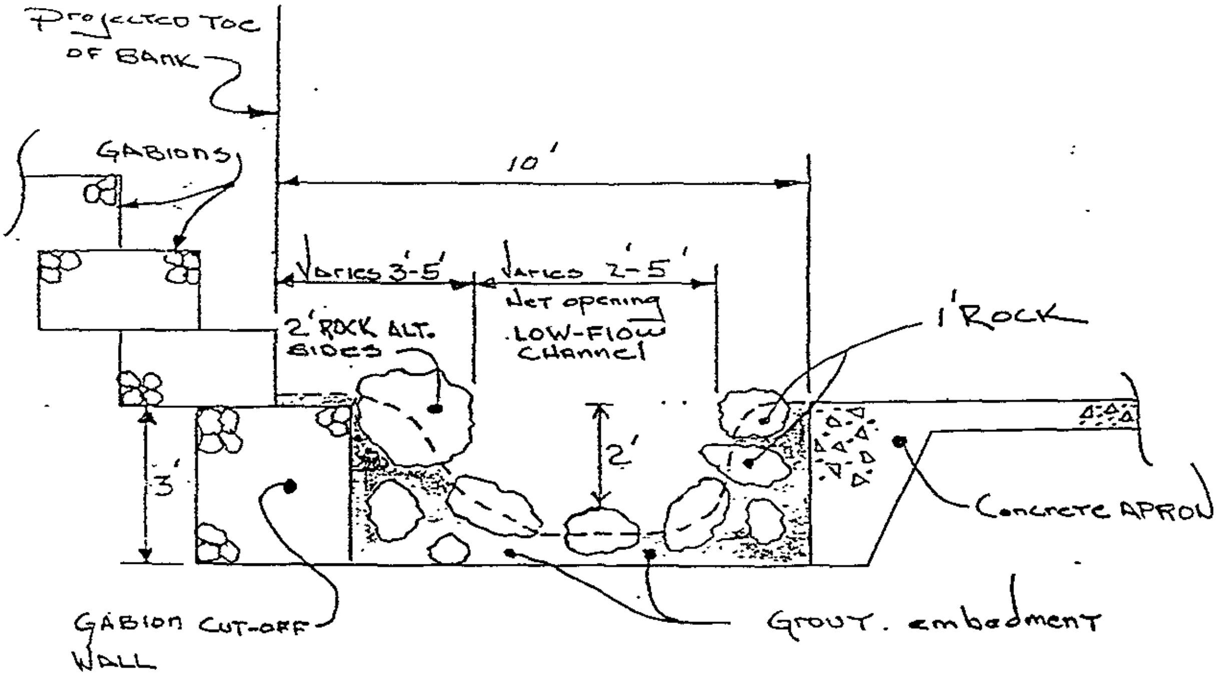
Calabazas Creek Flood Control Project Design Modifications
Permit No. 16833S92, Date: January 1, 1994
Sheet 5

Calabazas Creek Flood Control Project Design Modifications
Permit No. 16833S92, Date: January 1, 1994
Sheet 6

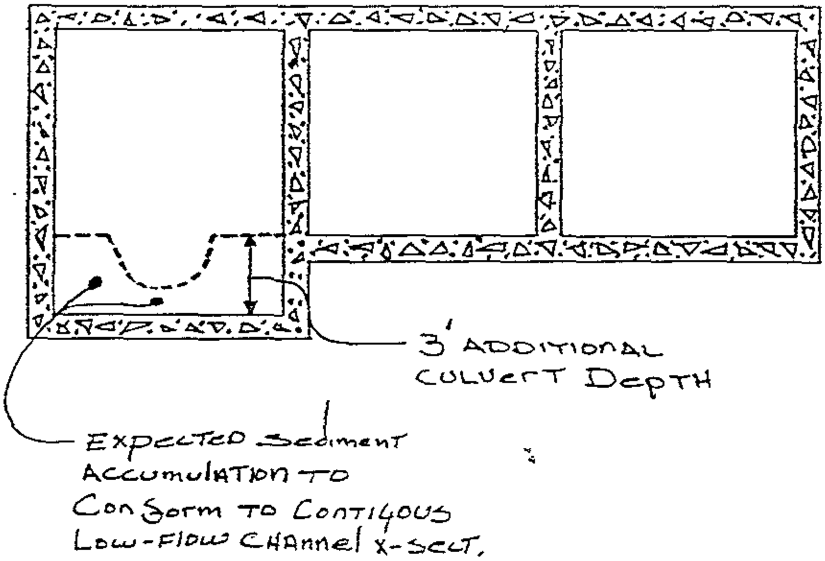


LOW FLOW CHANNEL

PLAN VIEW



D GROUTED ROCK LOW-FLOW CHANNEL
Section


3' Additional Culvert Depth
Expected Sediment Accumulation to Conform to Contigous Low-Flow Channel X-Sect.

C CULVERT LOW-FLOW CHANNEL
Section

NOTICE TO PERMITTEE

Please report the dates when you start and finish the work authorized by the inclosed permit. Also if you suspend work for an extended time, report when you stopped an when you resumed work. The forms below are for the purpose of reporting this information. The extra copy is for your records. If you find that you cannot complete the work within the time granted by the permit, please ask for an extension before your permit expires. If you materially change the plan and scope of the work, it will be necessary for you to submit a new drawing and request a modification of your permit.

- (cut on line)

DATE ________________ 19____

SUBJECT: Completion of work under Department of the Army permit No. 16833S92
TO: District Engineer, US Army Engr. Dist. San Francisco, Corps of Engineers
211 Main Street, San Francisco, CA ~~94015~~ 94105

In compliance with the conditions of the permit dated ______________, 19___ for Calabazas Creek Flood Control Project this is to notify you that such work has completed on ____________________, 19____.

Permittee: Santa Clara Valley Water District
Address 6489 Camden Avenue
San Jose, California

SIGNED ____________________

- (cut on line)

DATE ________________ 19____

SUBJECT: Resumption of work under Department of the Army permit No. 16833S92
TO: District Engineer, US Army Engr. Dist., San Francisco, Corps of Engineers
211 Main Street, San Francisco, CA 94105

In compliance with the conditions of the permit issued ______________, 19___ for Calabazas Creek Flood Control Project this is to notify you that such work was resumed on ____________________, 19____.

Permittee: Santa Clara Valley Water District
Address 6489 Camden Avenue
San Jose, California

SIGNED ____________________

- (cut on line)

DATE ________________ 19____

SUBJECT: Suspension of work under Department of the Army permit No. 16833S92
TO: District Engineer, US Army Engr. Dist., San Francisco, Corps of Engineers
211 Main Street, San Francisco, CA 94105

In compliance with the conditions of the permit issued ______________, 19___ for Calabazas Creek Flood Control Project this is to notify you that work will be suspended for ______ days, beginning ____________________, 19____.

Permittee: Santa Clara Valley Water District
Address 6489 Camden Avenue
San Jose, California

SIGNED ____________________

- (cut on line)

DATE ________________ 19____

SUBJECT: Commencement of work under Dept. of the Army permit No. 16833S92
TO: District Engineer, US Army Engr. Dist., San Francisco, Corps of Engineers
211 Main Street, San Francisco, CA 94105

In compliance with the conditions of the permit issued ______________, 19___ for Calabazas Creek Flood Control Project this is to notify you that the authorized work will be commenced on ____________________, 19____.

Permittee: Santa Clara Valley Water District
Address 6489 Camden Avenue
San Jose, California

SIGNED ____________________

SPN FL 33 REVISED 1 JAN

APPENDIX S-V

MEMORANDUM OF UNDERSTANDING WITH CALIFORNIA DEPARTMENT OF FISH AND GAME AND SECTION 1601 AGREEMENT

SANTA CLARA VALLEY WATER DISTRICT
AND
CALIFORNIA DEPARTMENT OF FISH AND GAME
MEMORANDUM OF UNDERSTANDING FOR CONSTRUCTION AND MAINTENANCE OF CALABAZAS CREEK FROM GUADALUPE SLOUGH TO MILLER AVENUE

This Memorandum of Understanding (MOU) by and between the California Department of Fish and Game, hereinafter called the "Department," and Santa Clara Valley Water District, hereinafter called the "District," is based upon the Engineer's Report and Final Environmental Impact Report for Calabazas Creek from Guadalupe Slough to Miller Avenue, dated April 1992, hereinafter "EIR" prepared by District. This Memorandum of Understanding is for project-specific streambed alteration agreements, as provided in Section 1601 of the Fish and Game Code, for each reach as it is constructed. This Memorandum is also for the purpose of delineating and defining post construction, routine maintenance activities to be carried out by District that shall not require further Notice and Agreement in compliance with the Fish and Game Code.

WHEREAS, the Department may in a timely manner propose modifications to construction proposals pursuant to Fish and Game Code Section 1601 to the District, and Section 1601 provides for agreement with the Department on construction and routine maintenance of drainage and flood control facilities; and

WHEREAS, the Department has a duty to conserve fish and wildlife resources of this State; and

WHEREAS, it is essential that the District construct channel facilities to provide flood protection and perform routine maintenance activities on District facilities to ensure that the facilities continue to provide the design level of flood protection to which the facilities were constructed, to protect the public's investment, to prevent loss of life and property and to comply with local ordinances and regulations, the regulations of federal flood insurance and other federally mandated programs; and

WHEREAS, the EIR has accurately identified the impacts of the proposed construction and maintenance activities, and has identified measures to fully mitigate those impacts; and

WHEREAS, it is mutually beneficial to delineate and define routine maintenance in this MOU, and to establish procedures to expedite maintenance activities, and to provide for the protection of fish and wildlife habitat during such maintenance activities;

WHEREAS, nothing in this agreement shall constitute a waiver of any future or current Department claims to the use and maintenance of natural conditions under the public trust doctrine;

THEREFORE, the Department and the District do agree as follows:

I. DEFINITIONS

"Construction activities" are defined as those channel modifications necessary to provide the design level of flood protection.

"Routine maintenance" is defined as those periodic District activities, deemed reasonably necessary by District to maintain the structural and functional integrity of the improved channels up to their design capacity.

II. CONSTRUCTION

The recommended project identified in the Engineers Report and EIR shall constitute construction activities within the definition provided herein. The project will be phased over a multi-year period. Therefore, notice and agreement from the District to the Department pursuant to Fish and Game Code §1601 for construction of each reach will be required. Mitigation for the project is provided as shown in Table 8, of the Engineer's Report and EIR (Exhibit A). A detailed plan for mitigation of riparian impacts within that reach will be submitted with each notification. Implementation of the mitigation plan will be staged and sequenced as indicated in the Engineer's Report and EIR.

III. CHANNEL MAINTENANCE

Upon completion of construction, the maintenance program guidelines identified in Table 7 of the Engineer's Report and EIR (Exhibit B) shall constitute routine maintenance activities within the definition provided herein and this Memorandum of Understanding shall serve as the notice and agreement pursuant to Fish and Game Code Section §1601 for Routine Maintenance Activities in Improved Channels.

IV. TIME AND MANNER OF WORK

Construction activity within the stream banks shall cease between October 16 through April 14 of each year. Work shall be limited to times when there is little or no streamflow. Time limitations for construction activities may be amended upon written agreement of the parties.

All mitigation elements for a particular segment of the project shall be installed within twelve months of the date of the Notice of Completion for the construction activities on that segment of the project. This condition can be modified to ensure that planting occurs in the fall or early winter. In that event, revegetation should occur within eighteen months.

Stream turbidity shall not be increased at any time due to construction from this project or any related construction activities related to this project. Any dams or diversions shall be constructed of clean gravels. Upon completion of project, the dams or diversions shall be breached and the gravels will be either removed or left in the streambed. All other construction material used in dams and diversions shall be removed upon completion of project.

Maintenance work shall be performed at a time and in a manner as described in the effective Memorandum of Understanding for Routine Maintenance Activities in Improved Channels (331-89, Exhibit C).

V. REPORTING REQUIREMENTS

The District shall provide written notification of the start of construction of each reach to the Regional Manager, Region 3 of the Department of Fish and Game.

The District's reporting requirements and associated fee schedule for maintenance activities shall be the same as those listed in the effective Memorandum of Understanding for Routine Maintenance Activities in Improved Channels (331-89).

VI. AMENDMENT AND TERMINATION

This Memorandum of Understanding may be amended at any time upon written agreement of the parties. Pursuant to Section 1601, agreement of the Department was obtained by the District for the construction and maintenance activities described in the Engineer's Report and EIR.

This Memorandum of Understanding may be terminated by either party at any time but no such termination shall become effective until six months after the party not indicating the termination has been duly notified in writing. Upon termination, the activities of the parties shall be governed by the provisions of Section 1601 of the California Fish and Game Code.

Brian Hunter
Regional Manager
Department of Fish and Game

7-30-92
Date

J T Ferguson
Santa Clara Valley Water District
Maintenance Manager

7/22/92
Date

P. Kay Whitlock
Flood Control Manager

7/20/92
Date

EXHIBIT A

TABLE 8
Calabazas Creek Flood Control Project
Summary of Impacts and Mitigation Measures

REACH	PROPOSED MEASURES	PROJECT IMPACTS	CONSTRUCTION IMPACTS	MITIGATION
1 Lawrence Expy. to Lochinvar Avenue	Regrade existing channel. Install gabion slope protection. Construction 500′ bypass channel. Install two additional 12 x 10 box culverts at Lochinvar Avenue.	Similar to routine channel maintenance, in-stream habitat disturbed by construction 31 (38%) trees removed 53 (62%) trees protected. 0.8 ac. of habitat removed. Visual character changed.	Construction activities generate noise and dust. Traffic impacted at Lochinvar Avenue.	- 625 native trees and shrubs planted on channel banks. 1.6 ac of habitat restored. Gabions soil-covered to soften visual impact and revegetate. No construction started during breeding season (Mar 1 to Jul 1). Traffic plan to be developed. Specifications for noise and dust.
2 Lochinvar Avenue to Homestead Rd.	Regrade existing channel. Install gabion slope protection. Install two additional 11 x 10 box culverts at Homestead Road.	Similar to routine channel maintenance, in-stream habitat disturbed by construction 22 (69%) trees removed 10 (31%) trees protected. 0.42 ac. of habitat removed. Visual character changed.	Construction activities generate noise and dust. Traffic impacted at Homestead Road.	- 375 native trees and shrubs planted on channel banks. Gabions soil-covered to soften visual impact and revegetate. 0.5 ac. of habitat restored. No construction started during breeding season (Mar 1 to Jul 1). Traffic plan to be developed. Specifications for noise and dust.
3 Homestead Road to Pruneridge Avenue	Regrade existing channel. Install gabion slope protection. Install 2 additional 11 x 10 box culverts at Pruneridge Avenue.	Similar to routine channel maintenance, in-stream habitat disturbed by construction 59 (66%) trees removed 31 (34%) trees protected. 2.1 ac. of habitat removed. Visual character changed.	Construction activities generate noise and dust. Traffic impacted at Pruneridge Avenue.	- Establishment of in-stream vegetation in Reach 3A. 1100 native trees and shrubs planted on channel banks in Reach 3B. Gabions soil-covered to soften visual impact and revegetate. 2.3 ac. of habitat restored. No construction started during breeding season (Mar 1 to Jul 1). Traffic plan to be developed. Specifications for noise and dust.
4 Pruneridge Avenue to Tantau Avenue	Regrade existing channel. Install gabion slope protection. Install two additional 11 x 10 box culverts at Tantau Avenue.	Similar to routine channel maintenance, in-stream habitat disturbed by construction 23 (27%) trees removed 62 (73%) trees protected. 1.4 ac. of habitat removed. Visual character changed.	Construction activities generate noise and dust. Traffic impacted at Tantau Avenue.	- 500 native trees and shrubs planted on channel banks. Gabions soil-covered to soften visual impact and revegetate. 1.5 ac. of habitat restored. No construction started during breeding season (Mar 1 to Jul 1). Traffic plan to be developed. Specifications for noise and dust.

EXHIBIT A

TABLE 8
Calabazas Creek Flood Control Project
Summary of Impacts and Mitigation Measures
(continued)

REACH	PROPOSED MEASURES	PROJECT IMPACTS	CONSTRUCTION IMPACTS	MITIGATION
5 Tantau Avenue to Hwy 280	Regrade existing channel. Install gabion slope protection.	Similar to routine channel maintenance, in-stream habitat disturbed by construction 6 (100%) trees removed. 0.6 ac. of habitat removed. Visual character *changed*.	Construction activities generate noise and dust.	- 500 native trees and shrubs planted on channel banks. Gabions soil-covered to soften visual impact and revegetate. 0.8 ac. of habitat restored. No construction *started during breeding season* (*Mar 1 to* Jul 1). Specifications for noise and dust.
8 Stevens Creek Blvd. to Miller Avenue	Regrade existing channel. Install gabion slope protection. Remove existing culvert and install clear span bridge at Miller Avenue.	Similar to routine channel maintenance, in-stream habitat disturbed by construction 20 (63%) trees removed 12 (37%) trees protected. 0.6 ac. of habitat removed. Visual character changed.	Construction activities generate noise and dust. Traffic impacted at Miller Avenue.	- 1100 native trees and shrubs planted on channel banks. Gabions soil-covered to soften visual impact and revegetate. 1.6 ac. habitat restored. No construction started during breeding season (Mar 1 to Jul 1). Traffic plan to be developed. Specifications for noise and dust.
9 Guadalupe Slough to Hwy. 237	Raised levees, floodproofed bridge at Moffet Park Drive, raised bridges at Hwy. 237 (by Caltrans).	Similar to routine channel maintenance, in-stream habitat disturbed by construction. Project will provide in-stream habitat area with low maintenance requirements. 0.06 ac. of wetlands removed.	Construction activities generate noise and dust.	No construction started during breeding season (Mar 1—Jul 1). Survey for Burrowing Owls and relocate if found. Specifications for noise and dust. Eastern levee and San Tomas Aquino Creek levee redesigned to create 1.7 ac. of wetlands to offset loss in Reaches 9, 10, 11.
10 Hwy. 237 to Old Mountain View Alviso Road	Raised levees, depressed maintenance roads, floodproofed bridge at Old Mountain View Alviso Road.	Similar to routine channel maintenance, in-stream habitat disturbed by construction. Project will provide in-stream habitat area with low maintenance requirements. 0.17 ac. of wetlands removed.	Construction activities generate noise and dust. Traffic impacted at Old Mountain View Alviso Road.	No construction started during breeding season (Mar 1—Jul 1). Survey for Burrowing Owls and relocate if found. Specifications for noise and dust. Traffic plan to be developed. Loss of wetlands to be mitigated in Reach 9.

EXHIBIT A

TABLE 8
Calabazas Creek Flood Control Project
Summary of Impacts and Mitigation Measures
(continued)

REACH	PROPOSED MEASURES	PROJECT IMPACTS	CONSTRUCTION IMPACTS	MITIGATION
11 Old Mountain View Alviso Road to Tasman Drive	Raised levees, depressed maintenance roads, floodproofed bridge at Tasman Drive.	Similar to routine channel maintenance, in-stream habitat disturbed by construction. Project will provide in-stream habitat area with low maintenance requirements. Average area available for fishery may decrease. Loss of 1.47 acres of wetlands.	Construction activities generate noise and dust. Traffic impacted at Tasman Drive.	No construction started during breeding season (Mar 1—Jul 1). Survey for Burrowing Owls and relocate if found. If sediment removal becomes necessary, construct secondary channel. Specifications for noise and dust. Traffic plan to be developed. Loss of wetlands to be mitigated in Reach 9.
12 Tasman Drive to Hwy 101	Floodwall on west bank. On east bank, raised levee 3,000 feet upstream of Tasman Drive, then floodwall to Hwy. 101.	Similar to routine channel maintenance, in-stream habitat disturbed by construction. Project will provide undisturbed in-stream habitat. Floodwalls will be visually obtrusive.	Construction activities generate noise and dust. Traffic impacted at road to Mission College.	No construction started during breeding season (Mar 1—Jul 1). Survey for Burrowing Owls and relocate if found. Architecturally treat floodwall. Specifications for noise and dust.
13—26 Hwy 101 to Lawrence Expy.	Floodwalls upstream of Hwy 101, Central Expy and Pomeroy Avenue. Clear span bridge at Kifer Road. Relocate El Camino Storm Drain downstream of SPRR.	Floodwalls will be visually obtrusive.	Construction activities generate noise and dust. Traffic impacted at Lakeside Drive, Central Expy., Kifer Road and Pomeroy Avenue. Architecturally treat floodwall. Specifications for noise and dust.	

APPENDIX B

TABLE 7
Calabazas Creek—Guadalupe Slough to Miller Avenue
Maintenance Standards for Sediment and Vegetation Removal

REACHES 1-5, 8: Lawrence Expressway to Hwy. 280 and Stevens Creek Boulevard to Miller Avenue

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Gabion Channel	Streambed scour	Expose 2′ of concrete cutoff wall	Place rock, restore bed
	Uniform sediments	Sediments above 1st gabion course (1.5′)	Remove sediments from the channel
	Local sediments (bars, sloughs, etc.)	Sediment bars above 2nd gabion course (3.0′)	Remove local sediments
	Local sediments with vegetation	Sediment bars above 1st gabion course (1.5′)	Remove local sediments and vegetation
	Woody vegetation below 3rd gabion course	Height of tallest woody vegetation exceeds 5′	Remove all woody vegetation below 3rd gabion only
	Brush, vines, etc. below 3rd gabion course	Height of tallest brush exceeds 4′	Cut brush below third gabion to 1′ or less
Natural Channel	Uniform sediment	Sediments 2′ above invert of adjacent bypass	Remove sediments from 10′ wide corridor
	Local sediment (bars, sloughs, etc.)	No limit	No maintenance required
	Woody vegetation	Woody vegetation occupies entire channel	Clear a 10′ corridor through congested areas
	Brush, vines, etc.	Dense brush/vines occupy entire	Clear a 10′ corridor through congested areas

EXHIBIT B

TABLE 7
Calabazas Creek—Guadalupe Slough to Miller Avenue Maintenance Standards for Sediment and Vegetation Removal (continued)

REACH 6: Hwy. 280 to Vallco Parkway

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Earth Channel Below Depressed Roads	Bank erosion	5′ from design condition	Restore eroded bank
	Uniform sediments	Sediments exceed 1′ deep (7′ below depressed road)	Remove sediments from the channel
	Local sediments (bars, sloughs, etc.)	*Sediment bars exceed 3′ deep*	Remove local sediments
	Local sediments with vegetation	Sediment bars exceed 2′ deep	Remove local sediments and vegetation
	Woody vegetation	Height of tallest woody vegetation exceeds 5′	Selectively remove woody vegetation
	Rock slope protection	Voids exceed five times rock diameter	Replace missing rock
Depressed Maintenance Roads	Vegetation on roads	No vegetation on roads	Preemergent spray
	Vegetation overhanging	Vegetation overhanging 6′ into roadway	Cut back overhanging vegetation to edge of maintenance road
Earth Slopes Above Maintenance Roads	Vegetation	No limit	

EXHIBIT B

TABLE 7
Calabazas Creek—Guadalupe Slough to Miller Avenue
Maintenance Standards for Sediment and Vegetation Removal
(continued)

REACH 7: Vallco Parkway to Stevens Creek Boulevard

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Box Culverts	Sediments	Sediment elevations exceed 12"	Remove sediment
	Uniform surface Abrasion	Surface roughness variation exceeds .04"	Resurface
	Local surface abrasion	Erosion of 0.2′	Resurface

EXHIBIT B

TABLE 7
Calabazas Creek—Guadalupe Slough to Miller Avenue
Maintenance Standards for Sediment and Vegetation Removal
(continued)

REACHES 9-11 Guadalupe Slough to Tasman Drive

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Low Flow Channel	Uniform sediments	Design top width decreased by 10′ or design invert increased by 3′	Remove sediments, restore design top width and depth
	Local sediments (bars, etc.)	Design top width decreased by 10′ invert increased by 4′	Remove local sediments restore design top width and depth locally
	Woody vegetation (willow, bamboo, etc.)	Height of tallest woody vegetation exceeds 6′	Remove all woody vegetation within low flow channel
	Flexible vegetation (cattails, bulrush)	No limit	No maintenance required
Habitat Area	Uniform sediments Sta. 0+00 to 25+00	No limit	No maintenance required
	Uniform sediments Sta. 25+00 to 49+00	Uniform sediment depth within 1′ of top of depressed maintenance road	Remove sediments to elevation 5 only within 50′ of the east levee
	Local sediments	Sediments above elevation 7.0	Remove local sediments to Elevation 5
	Woody vegetation (bamboo, willows, etc.)	Height of tallest woody vegetation exceeds 8′ or largest trunk diameter exceeds 3″	Remove woody vegetation only
	Flexible vegetation (cattails, bulrush, etc.)	No limit	No maintenance required
Maintenance Roads Inside Slope of Levees	Vegetation	Vegetation exceeds 3′	Eliminate vegetation

EXHIBIT B

TABLE 7
Calabazas Creek—Guadalupe Slough to Miller Avenue Maintenance Standards for Sediment and Vegetation Removal
(continued)

REACH 12: Tasman Drive to Highway 101

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Low Flow Channel	Sediment deposits	Uniform sediments in channel bottom exceed 3′ design top width decreased by 10′	Remove sediments restore low flow channel
	Woody vegetation (willows, bamboo, etc.)	Height of tallest vegetation growing within the low flow channel exceeds 6′	Cut or remove woody vegetation growing on the channel bottom. Vegetation overhanging from the habitat area should remain.
	Flexible vegetation	Height of tallest vegetation growing within the low flow channel exceeds 5′	Cut or remove vegetation growing on the channel bottom. Vegetation overhanging from the habitat area should remain.
Floodplain	Uniform sediments	Sediments 1 foot above inboard toe elevation of east levee	Remove sediments to inboard toe elevation of east levee.
	Local sediments bars, etc.	Local sediments 2′ above inboard toe elevation of east levee.	Remove sediments to inboard toe elevation of east levee.
	Woody vegetation	Height of tallest woody vegetation exceeds 5′	Remove or cut vegetation to vegetation to 1′ or less
	Flexible and low growing vegetation	Height of tallest flexible vegetation exceeds 3′	Remove or cut vegetation to 1′ or less
Habitat Area	Sediment and vegetation	No removal required within habitat area	No maintenance required

EXHIBIT B

TABLE 7
Calabazas Creek—Guadalupe Slough to Miller Avenue Maintenance Standards for Sediment and Vegetation Removal
(continued)

REACH 12: Tasman Drive to Highway 101

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Maintenance Roads and Inside Slope of easterly Levee	Vegetation	Vegetation exceeds 3′	Remove vegetation

REACHES 13-26: Highway 101 to Lawrence Expressway

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Concrete Channel	Sediments	Sediment depth exceed 12″	Remove sediment
	Uniform surface abrasion	Surface roughness variation exceeds .04′	Resurface
	Local surface abrasion	Erosion of .20′	Resurface

EXHIBIT 'C'

RECEIVED
AUG 14 1990

SANTA CLARA VALLEY WATER DISTRICT
AND
CALIFORNIA DEPARTMENT OF FISH AND GAME
MEMORANDUM OF UNDERSTANDING
ROUTINE MAINTENANCE ACTIVITIES IN IMPROVED CHANNELS

This Memorandum of Understanding by and between the California Department of Fish and Game, hereinafter called the "Department", and Santa Clara Valley Water District, hereinafter called the "Water District", is for the purpose of delineating and defining routine maintenance activities in improved channels that shall not require further Notice and Agreement in compliance with the Fish and Game Code.

WHEREAS, the Department is required to propose modifications to construction activity pursuant to Fish and Game Code Section 1601 to the Water District, and Section 1601 provides for agreement with the Department on routine maintenance of drainage and flood control facilities; and

WHEREAS, the Department has a duty to conserve fish and wildlife resources of this State; and

WHEREAS, it is essential that the Water District perform routine maintenance activities to maintain District facilities to ensure that the facilities continue to provide the design level of flood protection to which the facilities were constructed, to protect the public's investment, to prevent loss of life and property, and to comply with local ordinances and regulations, federal flood insurance regulations, and other federally mandated programs; and

WHEREAS, it is mutually beneficial to delineate and define routine maintenance, and to establish procedures to expedite maintenance activities, and to provide for the protection of fish and wildlife habitat during such maintenance activities;

WHEREAS, nothing in this agreement shall constitute a waiver of any future or current Department claims to the use and maintenance of natural conditions under the public trust doctrine;

THEREFORE, the Department and the Water District do agree as follows:

I. DEFINITIONS

An improved channel is defined as a waterway in which significant man-made alteration has occurred to improve the passage of flood flows, including straightening and containing within constructed banks and concrete-lined, riprapped, or earth trapezoid channels with engineered banks. The waterways listed in Appendix A attached hereto are the exclusive list of improved channels as defined in this Agreement.

Routine maintenance is defined as those periodically scheduled and implemented activities necessary to maintain the structural and functional integrity of the improved channel.

Channel banks, channel bottoms, and low flow channels are defined by reference to typical cross sections of flood control channels as shown in Diagram 1 attached hereto.

II. CHANNEL MAINTENANCE

The activities identified below for improved channels listed in Appendices A and B, shall constitute routine maintenance activities by definition and shall not require further notice to, and Agreement with, the Department.

The selection and application of herbicides will conform to all applicable State and Federal E.P.A. regulations.

A. Control of weeds and grasses on maintenance roads, on the areas between top of banks and adjacent property and on floodplains or overflow channels to comply with local fire regulations by mowing, discing, hand labor or herbicide application.

B. Control of weeds, grasses, and emergent aquatic vegetation on channel bottoms and banks, and on floodplains or overflow channels to maintain channel design capacity by mowing, hand labor or herbicide application.

C. Control of weeds and grasses on maintenance roads to provide a safe travelway to conduct facility inspection and maintenance activities by mowing, discing, hand labor or herbicide application.

D. Control of weeds and grasses on levees to conduct facility inspection by mowing, hand labor or herbicide application.

E. Control of weeds and grasses in revegetated mitigation areas and landscaped areas to allow plant establishment by mowing, discing, hand labor or herbicide application.

F. Removal of vegetation, silt and debris, and other obstructions to flow in the immediate vicinity (not-to-exceed 100 feet) of the following structures (1) streamflow measuring stations; (2) box culverts and bridges; (3) storm drain outfall structures; and, (4) drop structures (energy dissipaters) to maintain the structures' design functions. Surface flowing water, if any, will be diverted from work area when using equipment in the channel.

G. Removal of woody and herbaceous vegetation with hand labor and tools on channel bottoms and channel banks to maintain channel design capacity. Channels that are to be cleared in strips in alternating years to retain habitat for wildlife, as illustrated in Diagram 2, are indicated in Appendix A under applicable M.O.U. item "GS".

H. Removal of trees or branches that are in imminent danger of falling, fallen trees, and associated debris to maintain the channel design capacity.

J. Removal of accumulated sediment, debris, rubbish, and other obstructions from channels with concrete bottoms to maintain channel design capacity.

K. Removal of accumulated sediment, debris, rubbish and other obstructions in channels with unlined channel bottoms to maintain channel design capacity. Channels that are to be cleared in strips in alternating years to retain habitat for wildlife, as illustrated in Diagram 2, are indicated in Appendix A under applicable M.O.U. item "KS".

L. Removal of accumulated sediment, debris, rubbish and other obstructions in channels with unlined channel bottoms to maintain low flow channel design capacity or when necessary, to provide fish passage or habitat identified in District environmental documents.

M. Removal of accumulated sediment, debris, rubbish, and other obstructions from sediment basins to maintain design functions as identified in Appendix B.

N. Repair of failed sections of rock, gabion, concrete-lined or sacked concrete riprap bank protection to maintain bank stabilization measures previously installed for public health safety and benefit. Surface flowing water, if any, will be diverted from work area when using equipment in the channel.

III. TIME AND MANNER OF WORK

Maintenance work shall be performed at a time and in a manner which shall meet the District's obligations to public health and safety while recognizing the need to minimize adverse impacts to fish and wildlife resources and their habitat. Periods of concern to the Department are March through June for nesting birds, and October through March for anadromous fish.

IV. REPORTING REQUIREMENTS

The Water District shall provide written notification to the Lieutenant Warden for Santa Clara County of the monthly schedule for that work tentatively proposed.

The Water District shall provide to the Regional Manager, Region 3, of the Department, written notification of maintenance projects completed within the preceding quarter (quarterly reports). A maintenance project is defined as an improved channel wherein one or more of the maintenance activities identified in this Memorandum of Understanding have been performed during any given reporting period. Due dates for submitting quarterly reports shall be as follows:

May 15 for first quarter projects	(January through March)
August 15 for second quarter projects	(April through June)
November 15 for third quarter projects	(July through September)
February 15 for fourth quarter projects	(October through December)

A fee payable to the Department shall accompany each quarterly report. The fee amount shall be in accordance with the current fee schedule, as published by the Department for work performed under an MOU, based on the number of maintenance projects completed within a calendar year.

V. AMENDMENT AND TERMINATION

This Memorandum of Understanding may be amended at any time upon written agreement of the parties. Pursuant to Section 1601, agreement of the Department was obtained by the Water District for the improved channels listed in Appendix A. If the Water District gives notice to and obtains the agreement of the Department to construct additional improved channels, in compliance with Section 1601, any such additional improved channels will be added to Appendix A by written amendment of this Agreement, and all provisions of this Agreement shall apply.

This Memorandum of Understanding may be terminated by either party at any time but no such termination shall become effective until 30 days after the party not indicating the termination has been duly notified in writing. Upon termination, the activities of the parties shall be governed by the provisions of Section 1601 of the California Fish and Game Code.

Brian Hunter
Regional Manager
Department of Fish and Game

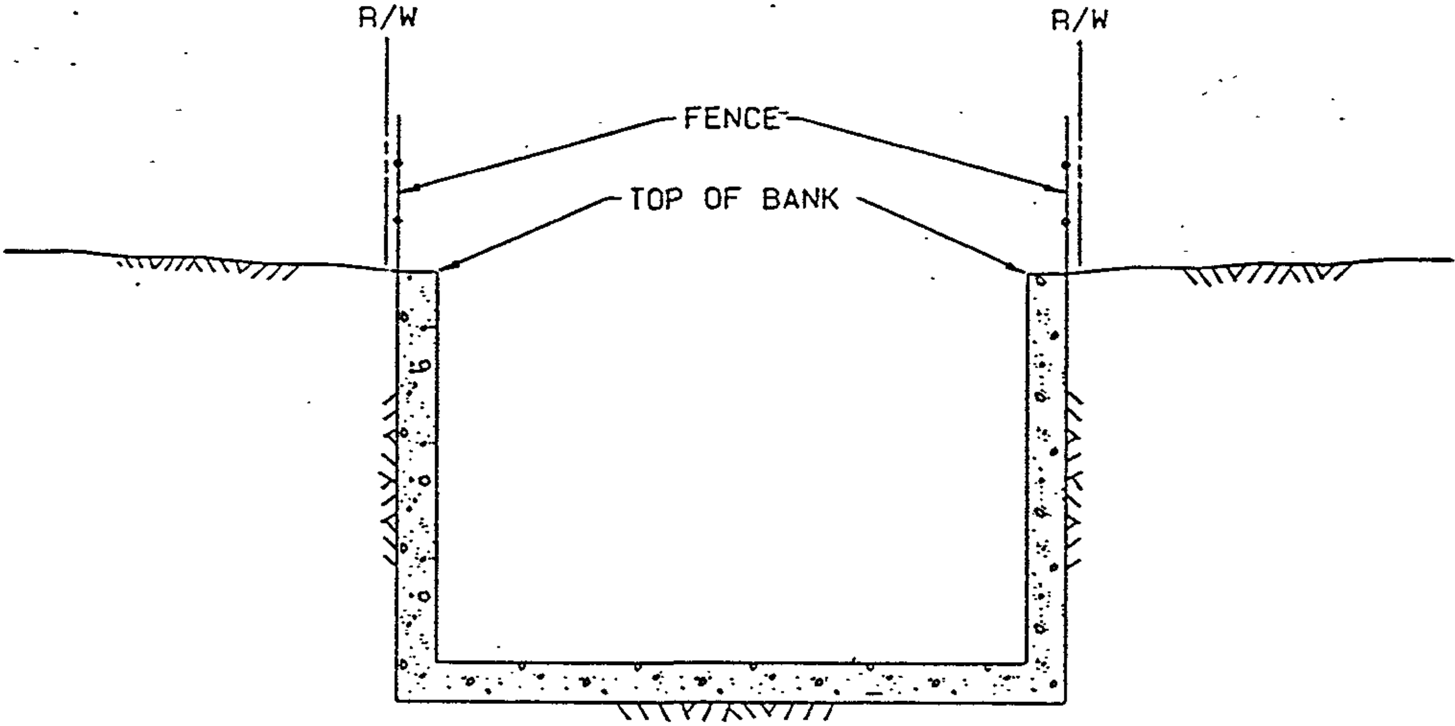
August 13, 1990
Date

Santa Clara Valley Water District
Maintenance Manager

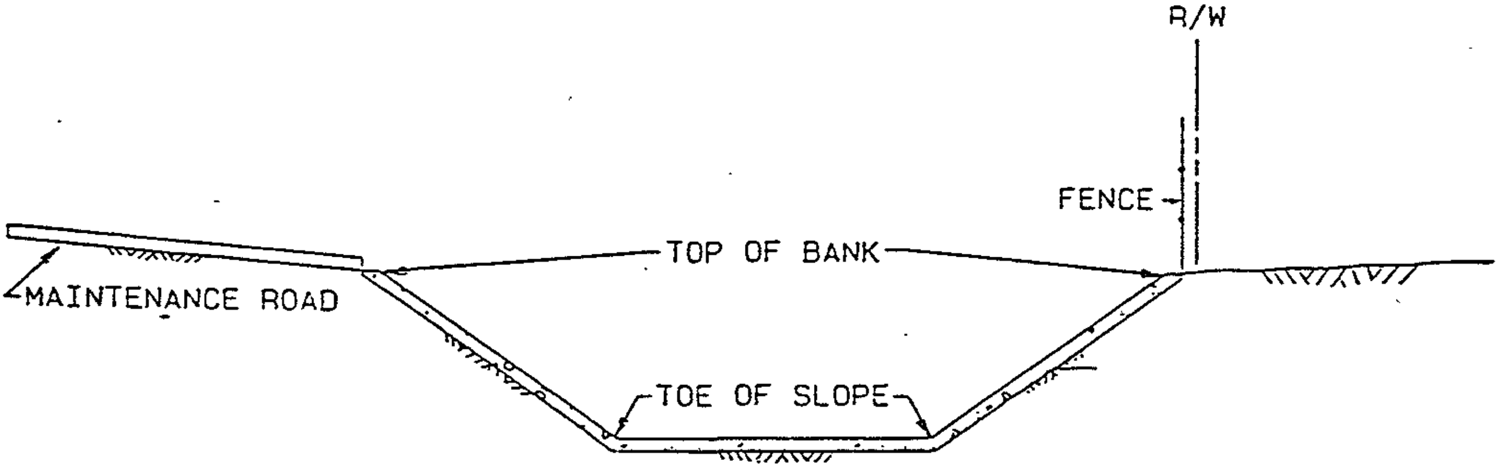
July 16, 1990
Date

Attachments

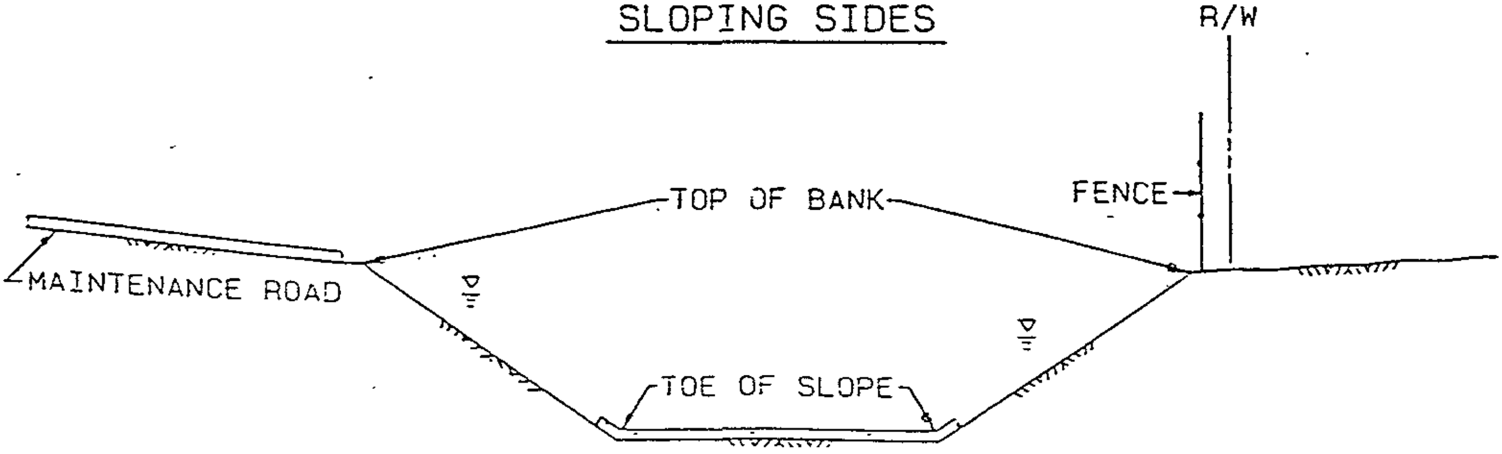
DIAGRAM NO. 1



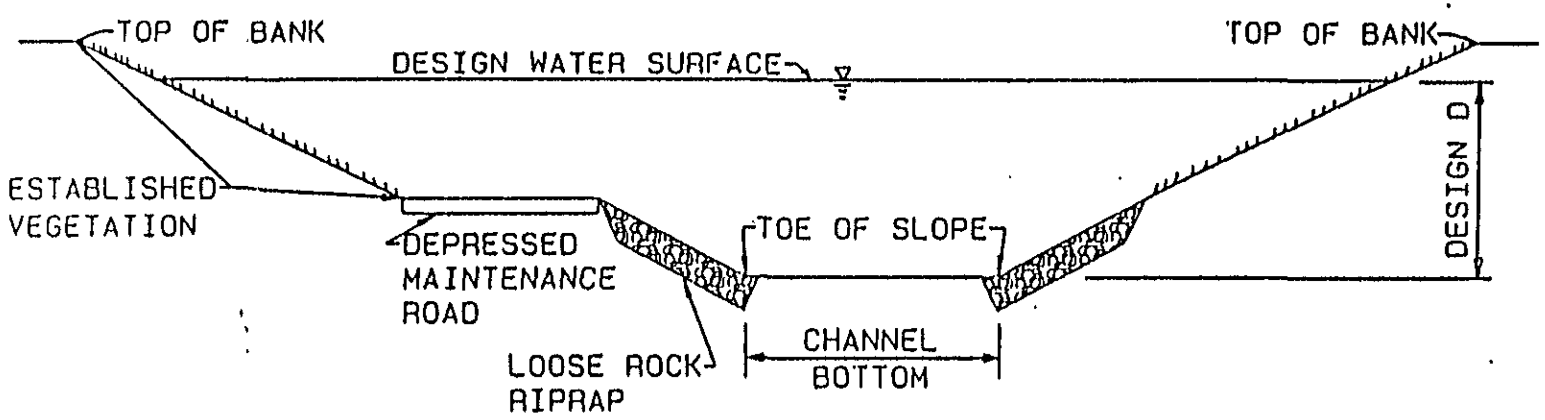
VERTICAL SIDES

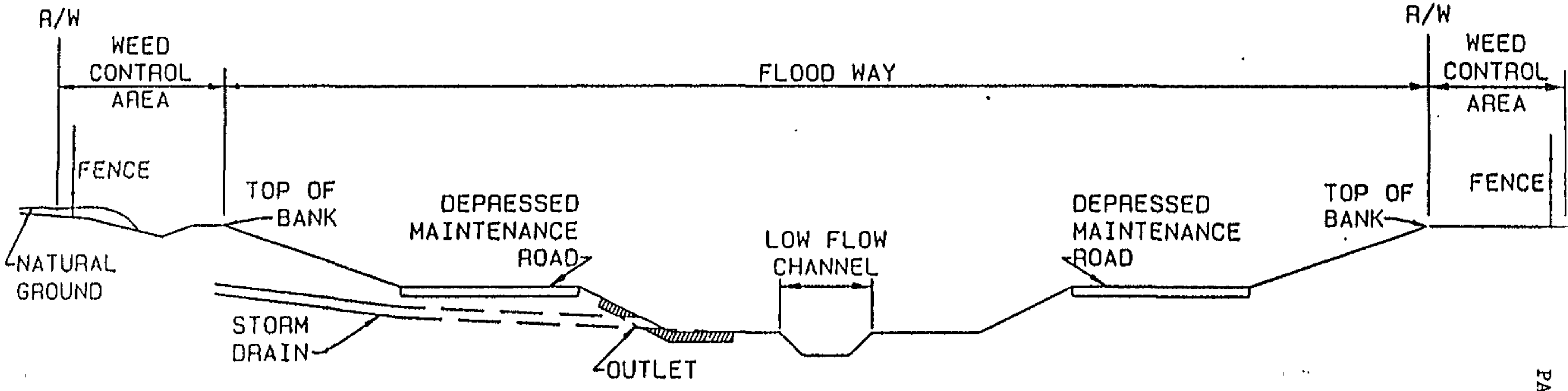


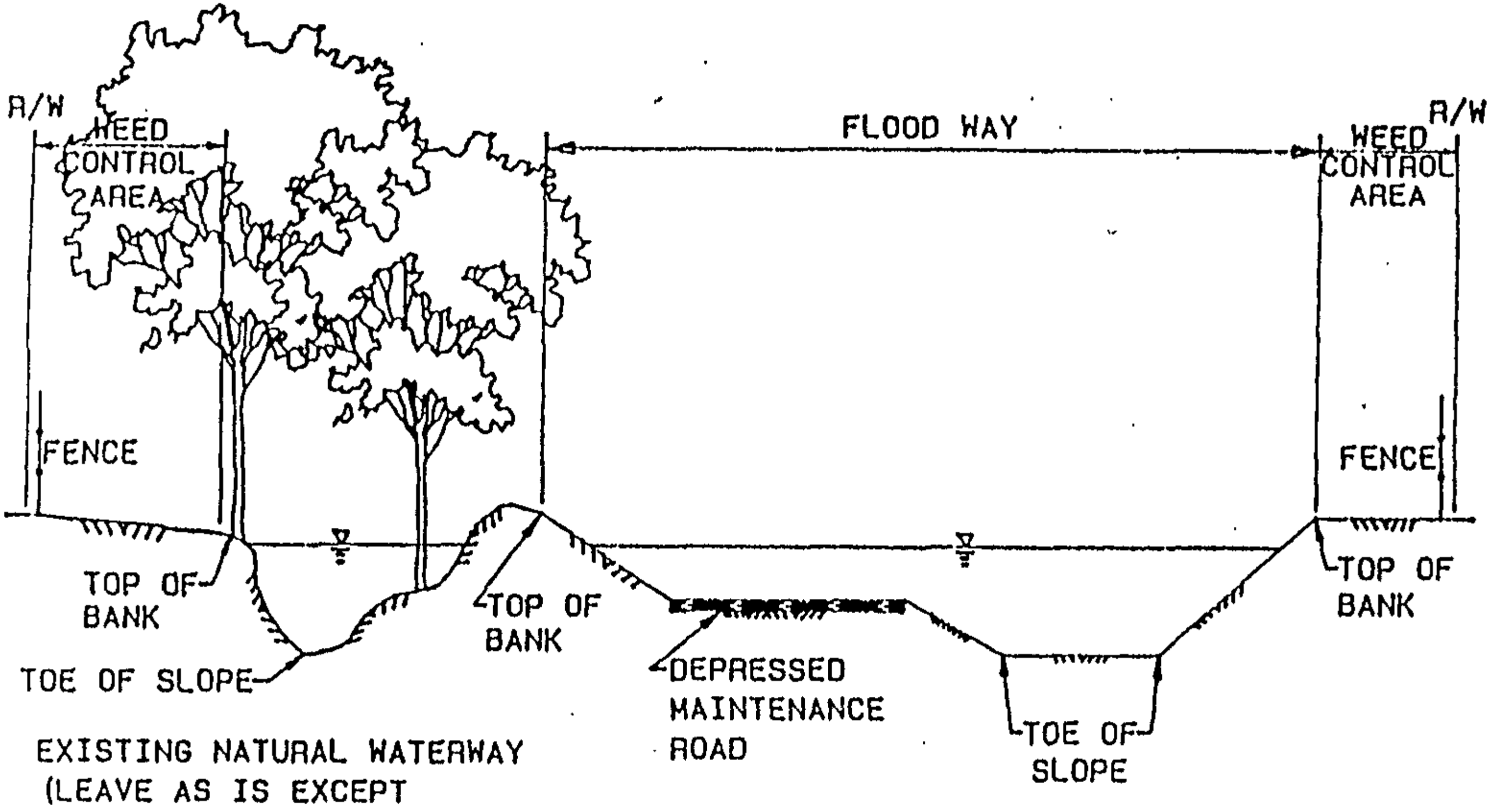
SLOPING SIDES



CONCRETE BOTTOM


TOP OF BANK
DESIGN WATER SURFACE
TOP OF BANK
DESIGN D
ESTABLISHED VEGETATION
DEPRESSED MAINTENANCE ROAD
TOE OF SLOPE
LOOSE ROCK RIPRAP
CHANNEL BOTTOM

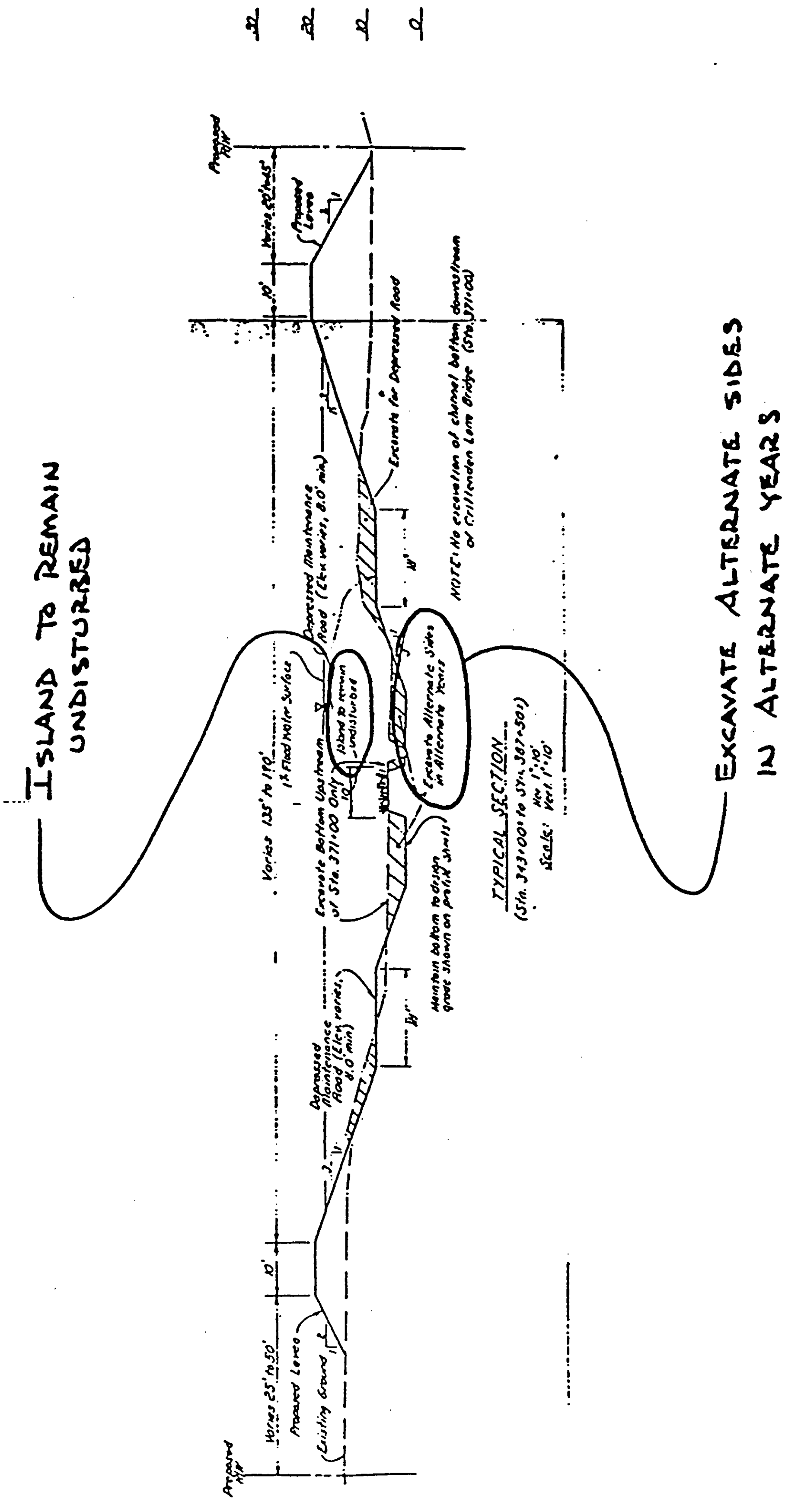

R/W
WEED CONTROL AREA
FLOOD WAY
R/W
WEED CONTROL AREA
FENCE
TOP OF BANK
DEPRESSED MAINTENANCE ROAD
LOW FLOW CHANNEL
DEPRESSED MAINTENANCE ROAD
TOP OF BANK
FENCE
NATURAL GROUND
STORM DRAIN
OUTLET



EXISTING NATURAL WATERWAY
(LEAVE AS IS EXCEPT
FOR MINOR CLEARING).

CONSTRUCTED CHANNEL
TAKES REMAINDER OF FLOW.

DIAGRAM NO. 2



ISLAND TO REMAIN UNDISTURBED
EXCAVATE ALTERNATE SIDES IN ALTERNATE YEARS
30
20
10
0
Proposed R/W
Varies 25' to 50'
10'
Proposed Levee
Existing Ground
2
1
3
1
Depressed Maintenance Road (Elev. varies, 8.0' min)
15'
Varies 135' to 190'
1% Flood Water Surface
Excavate Bottom Upstream of Sta. 371+00 Only
10
Island to remain undisturbed
Maintain bottom to design grade shown on profile sheets
Excavate Alternate Sides in Alternate Years
Depressed Maintenance Road (Elev. varies, 8.0' min)
18'
Excavate for Depressed Road
10'
Varies 20' to 45'
Proposed Levee
2
1
Proposed R/W
NOTE: No excavation of channel bottom downstream of Crittenden Lane Bridge (Sta. 371+00)

TYPICAL SECTION
(Sta. 343+00± to Sta. 387+50±)
Scale: Hor. 1"=10'
Vert. 1"=10'

APPENDIX A

NORTH CENTRAL ZONE

Creek Name - Project No.		Beg. Sta. End. Sta.	D/S Limits U/S Limits	Reach Length (ft.)	Channel Type and Related Information	Applicable M.O.U. Items
Calabazas Creek	2010	0+00 102+00	Guadalupe Slough Highway 101	10,200	Excavated Earth w/Engineered Earth Levees	A, B, C, D, F, G, H, Ks, L, N
Calabazas Creek	2010	102+00 291+60	Highway 101 Lawrence Expressway	18,960	Concrete Lined	A, C, F, G, H J, N
Calabazas Creek	2010	368+00 375+00	Highway 280 Vallco Parkway	700	Excavated Earth	A, B, C, E, F, G, H, K, L, N
Calabazas Creek	2010	375+00 385+00	Vallco Parkway Stevens Creek Boulevard	1,000	Concrete Box Culvert	E, F, G, H, J, N
Calabazas Creek	2010	444+04 446+72	Bollinger Road	268	Concrete Lined	A, B, C, F, H, J, L, N
Calabazas Creek	2010	476+91 477+92	Blaney (Drop Structure) Blaney	101	Concrete Lined	A, B, C, F, J, N
Daves Creek	2033	0+00 10+00	Los Gatos Creek Confluence Lark Avenue	1,000	Pipe	H, J
Daves Creek	2033	14+00 20+00	Wild Way Winchester Boulevard	600	Concrete Lined	A, B, C, F, H, J, N

STREAM OR LAKE ALTERATION FEES

Beginning September 1, 1982, the DFG must charge fees for all stream or lake alteration agreements. The current fee schedule is listed below (effective May 14, 1992).

These fees become necessary as result of Senate Bill 1326, Chapter 327, 1982, which requires the Department to recover the costs of administering the stream and lake alterations agreement program.

NOTE: Projects are defined as being the total project and not only that portion lying within the state's area of concern. Circle the fee below that applies to your project.

1601 APPLICATIONS (Public Agencies)

A. $132 (non-refundable) fee for projects costing less than $25,000.

B. $662 fee for projects costing from $25,000 to $500,000.

C. $1191 fee for projects costing over $500,000.

1603 COMMERCIAL GRAVEL OPERATIONS

A. $530 fee per application.

RENEWALS: 1601/1603 EXCLUDING GRAVEL (if project has not changed)

A. $109 fee per application for renewal.

* Renewals include those agreements which expire before completion of the project and which have no changes in the work described in the original agreement.

1603 APPLICATIONS (Private) EXCLUDING COMMERCIAL GRAVEL OPERATIONS

A. $132 (non-refundable) fee for projects costing less than $25,000.

B. $662 fee for projects costing from $25,000 to $500,000.

C. $1191 fee for projects costing over $500,000.

1606 APPLICATIONS (Timber Harvest)

A. $530 per application with 1 or 2 stream encroachments.

B. $662 per application with 3 or 4 stream encroachments.

C. $794 fee per application with 5 to 9 stream encroachments.

D. $883 fee per application with 10 or more stream encroachments.

We cannot process your application until the appropriate fee has been received (except for Purchase Order). When submitting your notification, complete the following information and make your check or money order payable to the "Department of Fish and Game". **PLEASE DO NOT SUBMIT CASH!!!** Under provisions of the Fish and Game Code, work cannot begin until agreement is reached. The application will be held in the Regional Office and not processed until receipt of all appropriate fees/documents.

Notifier's Name: ______________________ (please print) ______________________ (signature)

Address: SANTA CLARA VALLEY WATER DISTRICT
5750 ALMADEN EXPRESSWAY
SAN JOSE, CA 95118

______________________ (date)

Name of Stream: ______________________

Work Order No: ______________________

Total Cost of Project: $______________________

Fee Submitted: $______________________

MAIL TO:

Department of Fish and Game
P.O. Box 47
Yountville, CA 94599

Attention: Kaye L. Schol

Notification No. 045-92/93

Reach 1 2

AGREEMENT REGARDING PROPOSED STREAM OR LAKE ALTERATION

THIS AGREEMENT, entered into between the State of California, Department of Fish and Game, hereinafter called the Department, and **Santa Clara Valley Water District, 5750 Almaden Expressway, San Jose, 95118,** State of California, hereinafter called the operator, is as follows:

WHEREAS, pursuant to Division 2, Chapter 6 of California Fish and Game Code, the operator, on the 29th day of Sept., 1993, notified the Department that he intends to substantially divert or obstruct the natural flow of, or substantially change the bed, channel, or bank of, or use material from the streambed of, the following water: **Calabazas Creek**, in the County of Santa Clara, State of California.

WHEREAS, the Department (represented by Nancy Collins has made an inspection of subject area on the 3 day of Oct. 1993, and) has determined that such operations may substantially adversely affect existing fish ad wildlife resources including: riparian and aquatic habitat and associated flora and fauna.

THEREFORE, the Department hereby proposes measures to protect fish an wildlife during the operator's work. The operator hereby agrees to accept the following recommendations as part of his work: **Numbers 1,6,,9,10,12,16,21** from the list of recommendations enclosed with this agreement and the following special recommendations.

1. All work in or near the stream or lake shall be confined to the period **April 15, 1993 to April. 15, 1994.**
2. Project work shall be limited to the construction of the flood control channel on Calabazas Creek from Lawrence Expressway to Homestead.
3. First year construction within the creek channel shall be limited to the time period of July 1, 1994 to October 15, 1994. Second year construction time period will be dependent upon weather and nesting conditions of species in the area. Santa Clara Valley Water Districts Environmental Division shall make the determination after review of the construction areas.
4. Construction, channel maintenance, time and manner of work shall be limited to that which was agreed upon per the memorandum of understanding between this Department and the Santa Clara Valley Water District on July 20, 1992.
5. Mitigation shall be accomplished per memorandum of understanding. (Exhibit A, Table 8.)
6. All work shall be in accordance with plans submitted to this Department. Should project work be changed or altered in any manner with regards to the stream construction or mitigation, this Department shall be notified immediately and a new agreement or amendment shall be agreed upon and issued.

The operator, as designated by the signature on this agreement, shall be responsible for the execution of all elements of this agreement. A copy of this agreement must be provided to contractors and subcontractors and must be in their possession at the work site.

If the operator's work changes from that stated in the notification specified above, this agreement is no longer valid and a new notification shall be submitted to the Department of Fish and Game. Failure to comply with the provisions of this agreement and with other pertinent Code Sections, including but not limited to Fish and Game Code Sections 5650, 5652 and 5948, may result in prosecution.

Nothing in this agreement authorizes the operator to trespass on any land or property, nor does it relieve the operator of responsibility for compliance with applicable federal, state, or local laws or ordinances.

THIS AGREEMENT IS NOT INTENDED AS AN APPROVAL OF A PROJECT OR OF SPECIFIC PROJECT FEATURES BY THE DEPARTMENT OF FISH AND GAME. INDEPENDENT REVIEW AND RECOMMENDATIONS WILL BE PROVIDED BY THE DEPARTMENT AS APPROPRIATED ON THOSE PROJECTS WHERE LOCAL, STATE, OR FEDERAL PERMITS OR OTHER ENVIRONMENTAL REPORTS ARE REQUIRED.

This agreement becomes effective upon both parties signatures.

Operator ______________________

Nancy A Collins
Department Representative

Title Supervising Engineer

Title Game Warden

Organization Santa Clara Valley Water Dist

Department of Fish and Game, State of California

Date Dec. 14, 1993

Date Dec. 7, 1993

STATE OF CALIFORNIA—THE RESOURCES AGENCY PETE WILSON, *Governor*

DEPARTMENT OF FISH AND GAME
20 LOWER RAGSDALE DRIVE, SUITE 100
MONTEREY, CA 93940
(408) 649-2870

Notification No. 0045-92/93

Mr. Leroy A. Weese
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Subject: Streambed Alteration Agreement Extension

I have received your request for an extension on Calabazas Creek, Phase I which includes Reaches 1 and 2 for Santa Clara County, Notification No. 0045-92/93. Time extension will be granted from April 1, 1994 to April 1, 1995 as requested.

All conditions of the original agreement remain in effect.

A copy of this letter shall serve as notice to the Yountville office of the extension of time granted.

Sincerely,

N. Collins

N. Collins
Game Warden
P.O. Box 1501
Morgan Hill, CA 95038
(408) 649-2870

Notification No. 045-92/93
Reach 9,10,11,12,13

AGREEMENT REGARDING PROPOSED STREAM OR LAKE ALTERATION

THIS AGREEMENT, entered into between the State of California, Department of Fish and Game, hereinafter called the Department, and **Santa Clara Valley Water District, 5750 Almaden Expressway, San Jose, 95118,** State of California, hereinafter called the operator, is as follows:

WHEREAS, pursuant to Division 2, Chapter 6 of California Fish and Game Code, the operator, on the 29th day of Sept., 1993, notified the Department that he intends to substantially divert or obstruct the natural flow of, or substantially change the bed, channel, or bank of, or use material from the streambed of, the following water: **Calabazas Creek**, in the County of Santa Clara, State of California.

WHEREAS, the Department (represented by Nancy Collins has made an inspection of subject area on the 3 day of Oct. 1993, and) has determined that such operations may substantially adversely affect existing fish ad wildlife resources including: riparian and aquatic habitat and associated flora and fauna.

THEREFORE, the Department hereby proposes measures to protect fish an wildlife during the operator's work. The operator hereby agrees to accept the following recommendations as part of his work: **Numbers 1,6,,9,10,12,16,21** from the list of recommendations enclosed with this agreement and the following special recommendations.

1. All work in or near the stream or lake shall be confined to the period **April 15, 1993 to April. 15, 1994.**
2. Project work shall be limited to the construction of the flood control channel on Calabazas Creek from Guadalupe Slough to upstream of Arques Avenue.
3. First year construction within the creek channel shall be limited to the time period of July 1, 1994 to October 15, 1994. Second year construction time period will be dependent upon weather and nesting conditions of species in the area. Santa Clara Valley Water Districts Environmental Division shall make the determination after review of the construction areas.
4. Construction, channel maintenance, time and manner of work shall be limited to that which was agreed upon per the memorandum of understanding between this Department and the Santa Clara Valley Water District on July 20, 1992.
5. Mitigation shall be accomplished per memorandum of understanding. (Exhibit A, Table 8.)
6. All work shall be in accordance with plans submitted to this Department. Should project work be changed or altered in any manner with regards to the stream construction or mitigation, this Department shall be notified immediately and a new agreement or amendment shall be agreed upon and issued.

The operator, as designated by the signature on this agreement, shall be responsible for the execution of all elements of this agreement. A copy of this agreement must be provided to contractors and subcontractors and must be in their possession at the work site.

If the operator's work changes from that stated in the notification specified above, this agreement is no longer valid and a new notification shall be submitted to the Department of Fish and Game. Failure to comply with the provisions of this agreement and with other pertinent Code Sections, including but not limited to Fish and Game Code Sections 5650, 5652 and 5948, may result in prosecution.

Nothing in this agreement authorizes the operator to trespass on any land or property, nor does it relieve the operator of responsibility for compliance with applicable federal, state, or local laws or ordinances.

THIS AGREEMENT IS NOT INTENDED AS AN APPROVAL OF A PROJECT OR OF SPECIFIC PROJECT FEATURES BY THE DEPARTMENT OF FISH AND GAME. INDEPENDENT REVIEW AND RECOMMENDATIONS WILL BE PROVIDED BY THE DEPARTMENT AS APPROPRIATED ON THOSE PROJECTS WHERE LOCAL, STATE, OR FEDERAL PERMITS OR OTHER ENVIRONMENTAL REPORTS ARE REQUIRED.

This agreement becomes effective upon both parties signatures.

Operator
Title Supervising Engineer
Organization Santa Clara Valley Water Dist
Date Dec. 14, 1993

Nancy A Collins
Department Representative
Title Game Warden
Department of Fish and Game, State of California
Date Dec. 7, 1993

S-315

STATE OF CALIFORNIA—THE RESOURCES AGENCY PETE WILSON, Governor

DEPARTMENT OF FISH AND GAME
20 LOWER RAGSDALE DRIVE, SUITE 100
MONTEREY, CA 93940
(408) 649-2870

2/01 LAW W/A
TKYung

Notification No. 0045-92/93

Mr. Leroy A. Weese
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Subject: Streambed Alteration Agreement Extension

I have received your request for an extension on Calabazas Creek, Phase II which includes Reaches 9, 10, 11, 12, and 13 in Santa Clara County, Notification No. 0045-92/93. Time extension will be granted from April 1, 1994 to April 1, 1995 as requested.

All conditions of the original agreement remain in effect.

A copy of this letter shall serve as notice to the Yountville office of the extension of time granted.

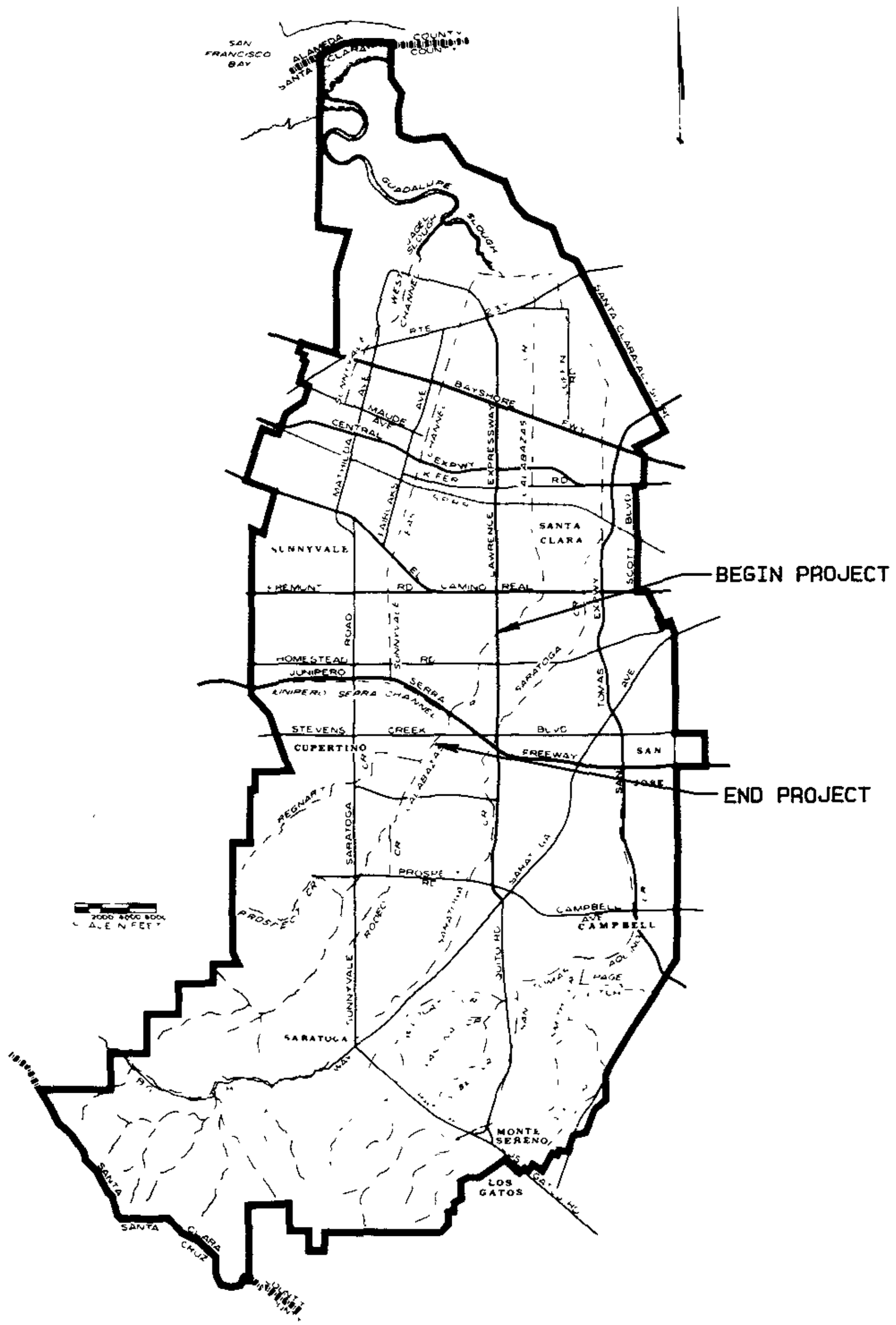
Sincerely,

N. Collins

N. Collins
Game Warden
P.O. Box 1501
Morgan Hill, CA 95038
(408) 649-2870

APPENDIX S-VI

PLATES SHOWING TYPICAL PLANTING ARRANGEMENTS (RIPARIAN HABITAT, REACHES 1-8)



MAP AND CONCEPTUAL PLAN

FOR

CALABAZAS CREEK REVEGETATION

LAWRENCE EXPRESSWAY TO MILLER AVENUE

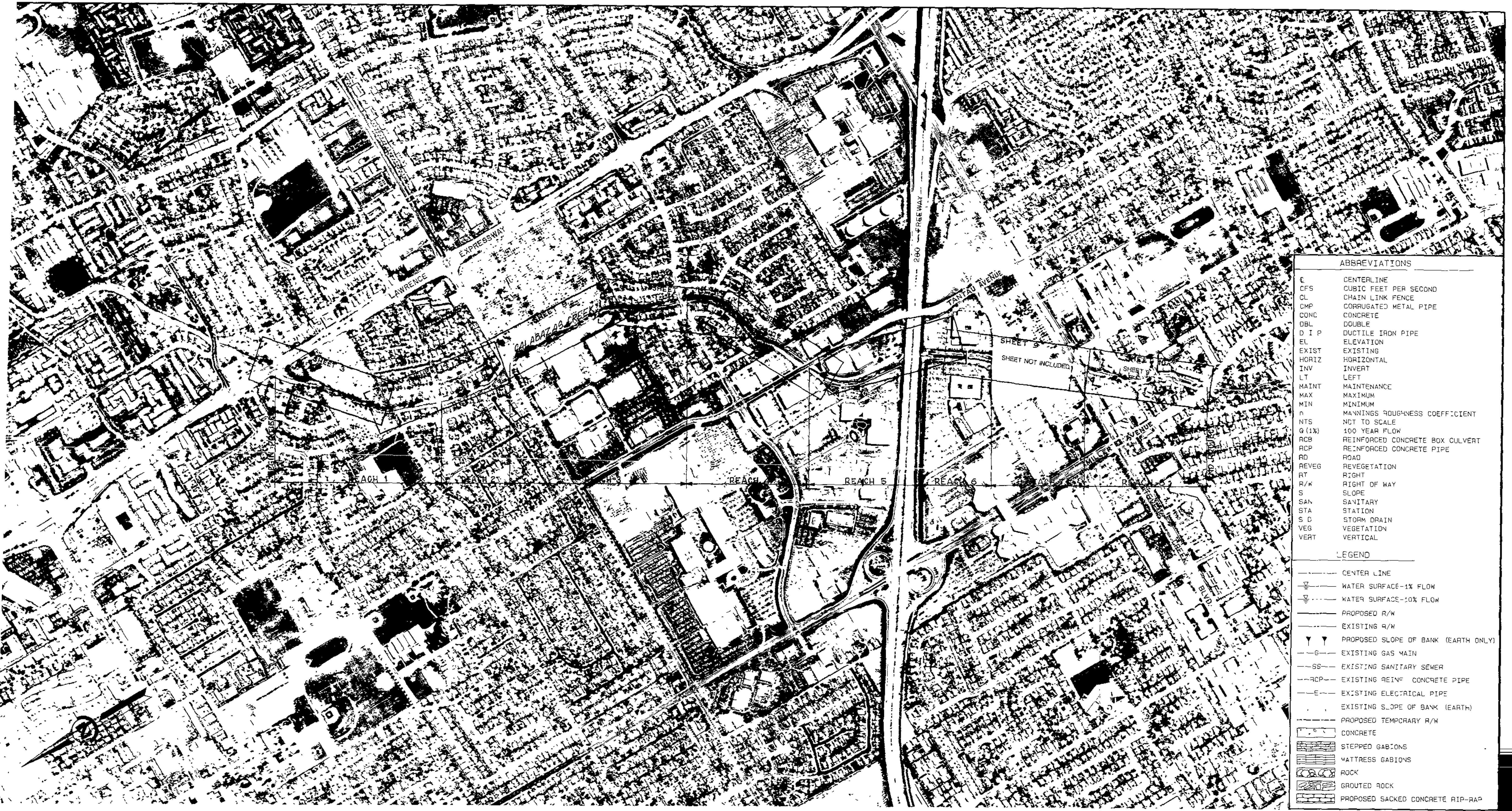
Santa Clara Valley Water District

NORTH CENTRAL FLOOD CONTROL ZONE **PROJECT NO. 20102**

INDEX

SHEET NO.	DESCRIPTION
3R-9R	REVEGETATION PLANS AND TYPICAL SECTIONS
10R	PLANTING DETAILS

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN



ABBREVIATIONS

℄	CENTERLINE
CFS	CUBIC FEET PER SECOND
CL	CHAIN LINK FENCE
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
DBL	DOUBLE
D I P	DUCTILE IRON PIPE
EL	ELEVATION
EXIST	EXISTING
HORIZ	HORIZONTAL
INV	INVERT
LT	LEFT
MAINT	MAINTENANCE
MAX	MAXIMUM
MIN	MINIMUM
n	MANNINGS ROUGHNESS COEFFICIENT
NTS	NOT TO SCALE
Q (1%)	100 YEAR FLOW
RCB	REINFORCED CONCRETE BOX CULVERT
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
REVEG	REVEGETATION
RT	RIGHT
R/W	RIGHT OF WAY
S	SLOPE
SAN	SANITARY
STA	STATION
S D	STORM DRAIN
VEG	VEGETATION
VERT	VERTICAL

LEGEND

—·—·—	CENTER LINE
▽ —·—	WATER SURFACE-1% FLOW
▽ ···—	WATER SURFACE-10% FLOW
———	PROPOSED R/W
—·—·—	EXISTING R/W
▼ ▼	PROPOSED SLOPE OF BANK (EARTH ONLY)
—G—	EXISTING GAS MAIN
—SS—	EXISTING SANITARY SEWER
—RCP—	EXISTING REINF CONCRETE PIPE
—E—	EXISTING ELECTRICAL PIPE
. .	EXISTING SLOPE OF BANK (EARTH)
———	PROPOSED TEMPORARY R/W
▭	CONCRETE
▤	STEPPED GABIONS
▤	MATTRESS GABIONS
▨	ROCK
▨	GROUTED ROCK
▤	PROPOSED SACKED CONCRETE RIP-RAP
▭	EXIST TREE CANOPY

REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES:

PHOTOGRAPHY BY AIR FLIGHT SERVICE DATE: 3-29-85 RECTIFICATION BY: AEROTEC, INC. 85011

DATE
DESIGN
DRAWN
CHECKED

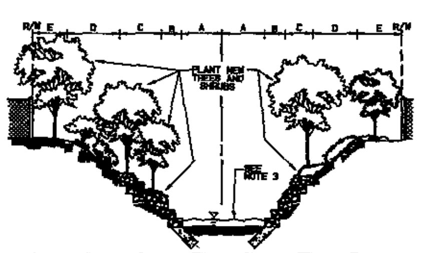
Santa Clara Valley Water District

ENGINEERING CERTIFICATION
PROJECT ENGINEER R.C.E. NO
DIVISION ENGINEER R.C.E. NO

ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO

CALABAZAS CREEK
INDEX TO SHEETS

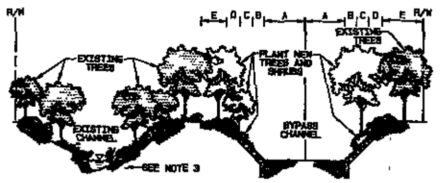
SCALE 1"= 500
SHEET **2R** OF 10



CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10	5/10					5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE									
CALIF. BUCKEYE	1									
BIG LEAF MAPLE										
CALIF. BOX ELDER			1							
FREMONT COTTONWOOD										
COAST LIVE OAK	3									4
VALLEY OAK										
BLUE ELDERBERRY									1	
CALIF. BAY		1								
CALIF. BLACK WALNUT			1					1		
CALIF. SYCAMORE			1							
WHITE ALDER								1		

CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10					5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE									
MANZANITA (H. MCMINN)	2									
DWARF COYOTE BRUSH		3								1
CEANOTHUS (CONCHA)		2							3	
CEANOTHUS (RAY HARTMAN)		3							3	
TOYON			3					4		
HOLLY LEAVED CHERRY		2	1							3
COFFEEBERRY		3	3					2	2	
PINK WINTER CURRANT			1					3	3	
CALIF. ROSE			2					2		
FLANNEL BUSH	1							3		

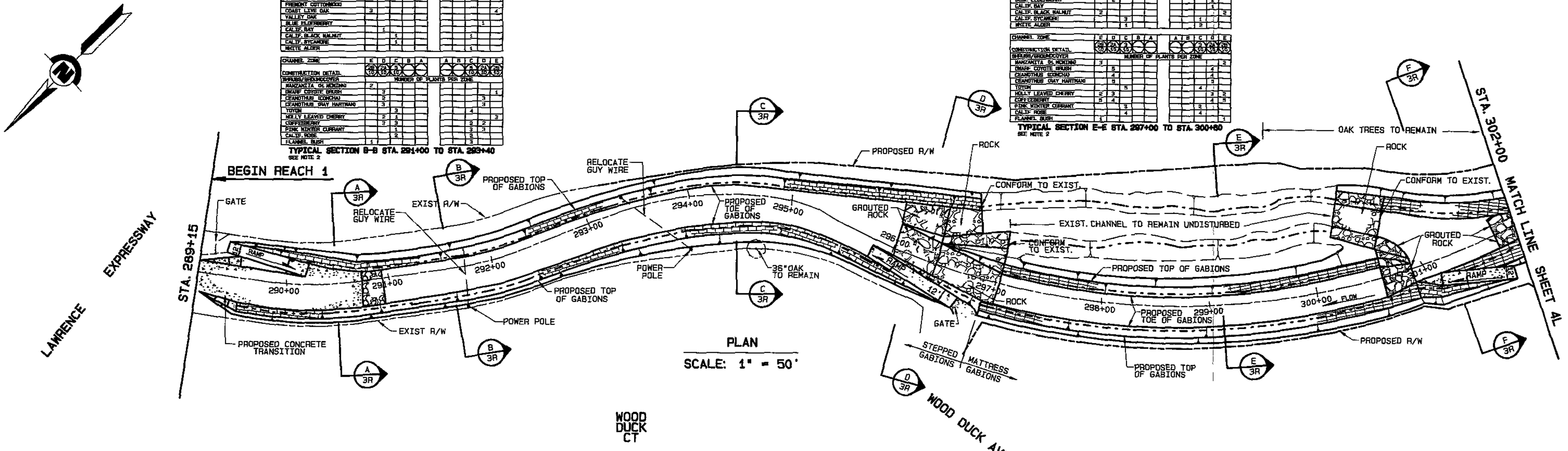
TYPICAL SECTION B-B STA. 291+00 TO STA. 293+40
SEE NOTE 2

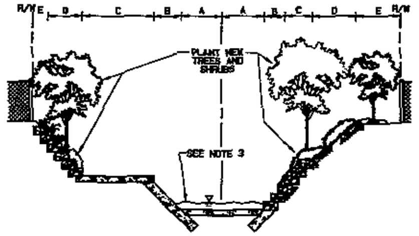


CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10	3/10				2A/10	3/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE									
CALIF. BUCKEYE										2
BIG LEAF MAPLE								1		
CALIF. BOX ELDER			1							
FREMONT COTTONWOOD			1							
COAST LIVE OAK	6									6
VALLEY OAK	1	1								2
BLUE ELDERBERRY		2							2	
CALIF. BAY									1	
CALIF. BLACK WALNUT	2									2
CALIF. SYCAMORE			3					1		
WHITE ALDER			1					2		

CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	3/10					3/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE									
MANZANITA (H. MCMINN)	3									2
DWARF COYOTE BRUSH		5							4	
CEANOTHUS (CONCHA)		4							4	
CEANOTHUS (RAY HARTMAN)		5							5	
TOYON			5					4		
HOLLY LEAVED CHERRY	2	3							3	2
COFFEEBERRY	5	4							4	5
PINK WINTER CURRANT			3					2		
CALIF ROSE			4					4		
FLANNEL BUSH	1									1

TYPICAL SECTION E-E STA. 297+00 TO STA. 300+60
SEE NOTE 2

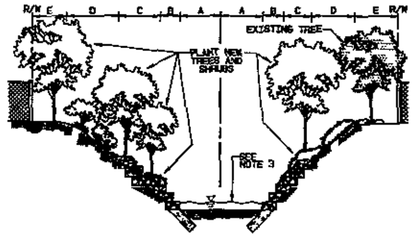




CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	2A/10	6/10						5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE									
CALIF BUCKEYE	1									1
BIG LEAF MAPLE										
CALIF. BOX ELDER	1									
FREMONT COTTONWOOD										
COAST LIVE OAK	3									4
VALLEY OAK										
BLUE ELDERBERRY									1	
CALIF. BAY										
CALIF. BLACK WALNUT		1								1
CALIF. SYCAMORE								2		
WHITE ALDER		1								

CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10					5/10	2A/10	1/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE									
MANZANITA (H. MCMINN)	1									1
DWARF COYOTE BRUSH		2							2	
CEANOTHUS (CONCHA)		2							2	
CEANOTHUS (RAY HARTMAN)	2									3
TOYON	2									2
HOLLY LEAVED CHERRY		2	1						2	
COFFEEBERRY		2	2					2	3	
PINK WINTER CURRANT			1					1		
CALIF. ROSE			2					2		
FLANNEL BUSH	1									

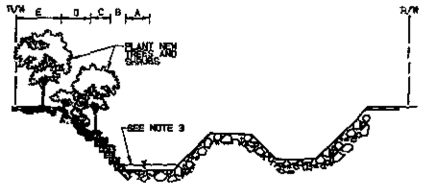
TYPICAL SECTION A-A STA. 289+15 TO STA. 291+00
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10	5/10					5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE									
CALIF. BUCKEYE	1									2
BIG LEAF MAPLE			1							
CALIF BOX ELDER			1					1		
FREMONT COTTONWOOD										
COAST LIVE OAK	4									4
VALLEY OAK										
BLUE ELDERBERRY		1								
CALIF. BAY										
CALIF. BLACK WALNUT			2					1		
CALIF. SYCAMORE			2					2		
WHITE ALDER			1					1	1	

CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10					5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE									
MANZANITA (H. MCMINN)	1									2
DWARF COYOTE BRUSH		3							3	
CEANOTHUS (CONCHA)		3							2	
CEANOTHUS (RAY HARTMAN)		4							4	
TOYON			3					3		
HOLLY LEAVED CHERRY		4							4	
COFFEEBERRY		3						4	3	
PINK WINTER CURRANT			3					1		
CALIF. ROSE			2					3		
FLANNEL BUSH	1		2							

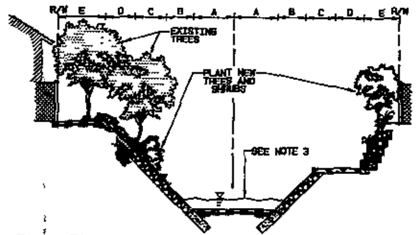
TYPICAL SECTION C-C STA. 293+40 TO STA. 296+00
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	1/10									
TREES	NUMBER OF PLANTS PER ZONE									
CALIF. BUCKEYE	1									
BIG LEAF MAPLE										
CALIF. BOX ELDER										
FREMONT COTTONWOOD										
COAST LIVE OAK	3									
VALLEY OAK										
BLUE ELDERBERRY										
CALIF. BAY										
CALIF. BLACK WALNUT			1							
CALIF. SYCAMORE										
WHITE ALDER										

CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	3/10							
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE									
MANZANITA (H. MCMINN)	1									
DWARF COYOTE BRUSH		2								
CEANOTHUS (CONCHA)		2								
CEANOTHUS (RAY HARTMAN)		3								
TOYON			2							
HOLLY LEAVED CHERRY		3								
COFFEEBERRY			5							
PINK WINTER CURRANT			1							
CALIF. ROSE			2							
FLANNEL BUSH										

TYPICAL SECTION D-D STA. 296+00 TO STA. 297+00
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	1/10								2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE									
CALIF. BUCKEYE										1
BIG LEAF MAPLE										
CALIF. BOX ELDER										
FREMONT COTTONWOOD										
COAST LIVE OAK	1									3
VALLEY OAK										
BLUE ELDERBERRY									1	
CALIF. BAY										
CALIF. BLACK WALNUT										1
CALIF. SYCAMORE										
WHITE ALDER										

CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	3/10					3/10	2A/10	1/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE									
MANZANITA (H. MCMINN)	1									1
DWARF COYOTE BRUSH		1							2	
CEANOTHUS (CONCHA)		1							2	
CEANOTHUS (RAY HARTMAN)	2									2
TOYON			1							2
HOLLY LEAVED CHERRY		2							2	
COFFEEBERRY	3									4
PINK WINTER CURRANT			1					1		
CALIF ROSE			1					2		
FLANNEL BUSH										1

TYPICAL SECTION F-F STA. 300+60 TO STA. 302+00
SEE NOTE 2

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
←3 INCHES ON ORIGINAL PLAN→

DESCRIPTION	DATE	APPR

REFERENCE INFORMATION AND NOTES

1. DATA COLLECTED IN 1988.
2. TYPICAL SECTIONS VIEWED LOOKING UPSTREAM.
3. TYPICAL SECTIONS SHOW ORDINARY HIGH WATER. (APPROX. ONE FOOT DEPTH)
4. TYPICAL SECTIONS NOT TO SCALE.
5. ZONES A AND B ARE LOCATED IN THE CHANNEL BOTTOM AND THE LOWER 4 FEET OF GABION CHANNEL LINING. NO REVEGETATION EFFORTS ARE PROPOSED IN THESE ZONES EXCEPT AS NOTED.

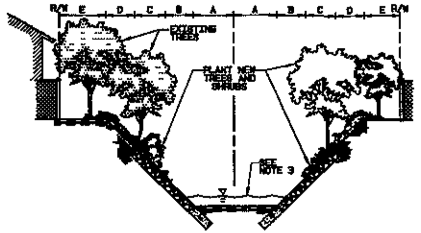
DATE 11/20/91
DESIGN KR/MM
DRAWN CM/SL
CHECKED KR

Santa Clara Valley Water District

Kurt Ridder
PROJECT ENGINEER
DIVISION ENGINEER

CALABAZAS CREEK
REACHES 1-8
CONCEPTUAL REVEGETATION PLANS

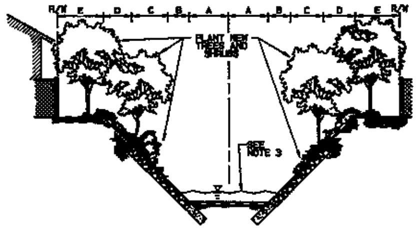
SCALE AS SHOWN
SHEET 3R OF 10



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10	3/10							2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE											2
BIG LEAF MAPLE											
CALIF. BOX ELDER									2		
FREMONT COTTONWOOD			2								
COAST LIVE OAK	3										6
VALLEY OAK											
BLUE ELDERBERRY			1							2	
CALIF. BAY										1	
CALIF. BLACK WALNUT			1						2		
CALIF. SYCAMORE			2								
WHITE ALDER											

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						3/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	2										2
DWARF COYOTE BRUSH		3								4	
CEANOTHUS (CONCHA)	3										3
CEANOTHUS (RAY HARTMAN)		5								4	
TOYON			3						4		
HOLLY LEAVED CHERRY		5								4	
COFFEEBERRY		8								7	
PINK WINTER CURRANT			2						2		
CALIF. ROSE			3						3		
FLANNEL BUSH		1									

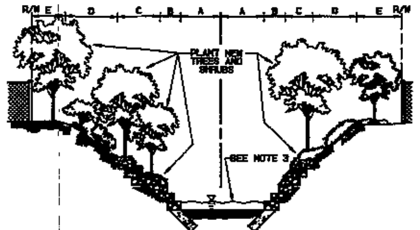
TYPICAL SECTION B-B STA. 303+80 TO STA. 306+00
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10	3/10						3/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	2										2
BIG LEAF MAPLE											
CALIF. BOX ELDER			1						1		
FREMONT COTTONWOOD											
COAST LIVE OAK	7										8
VALLEY OAK	6										5
BLUE ELDERBERRY			1						1		
CALIF. BAY		1								2	
CALIF. BLACK WALNUT			2						2		
CALIF. SYCAMORE			1								
WHITE ALDER			1						1		

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	3/10						3/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	3									1	1
DWARF COYOTE BRUSH		3	3						3	4	
CEANOTHUS (CONCHA)	3									3	3
CEANOTHUS (RAY HARTMAN)	3	3	3							3	3
TOYON			4						3		4
HOLLY LEAVED CHERRY	4									4	4
COFFEEBERRY	7	7								7	7
PINK WINTER CURRANT			4						3		
CALIF. ROSE		1	6						8		
FLANNEL BUSH		2								1	

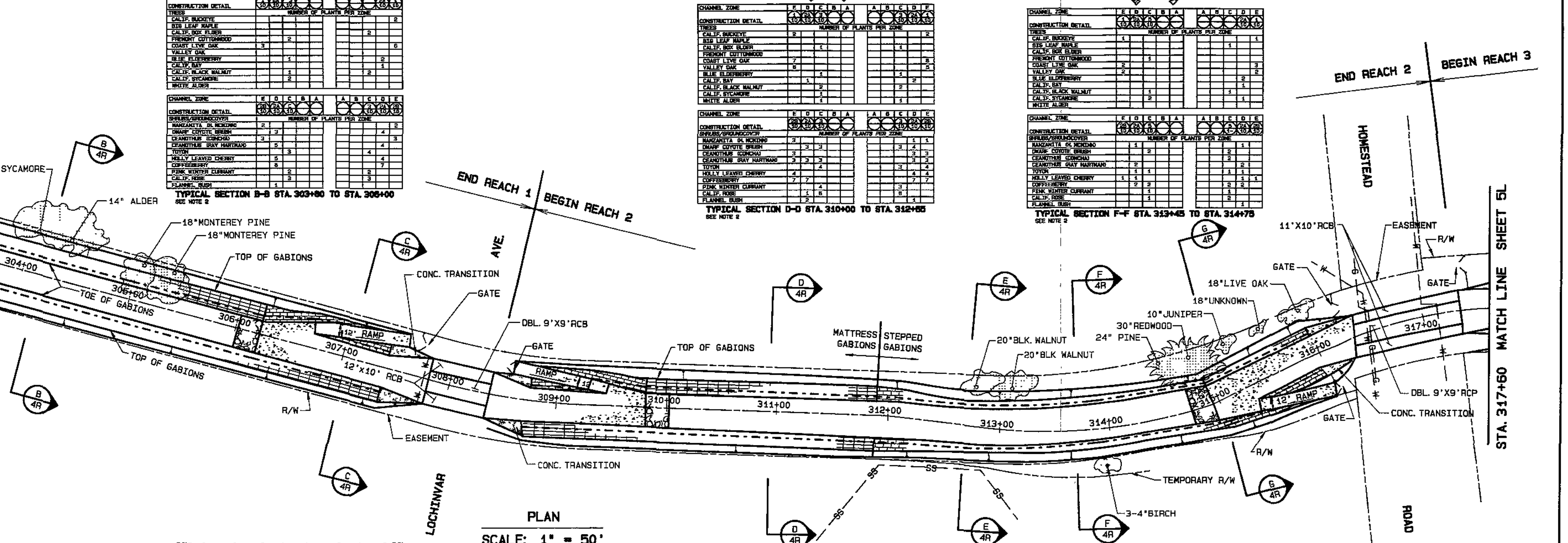
TYPICAL SECTION D-D STA. 310+00 TO STA. 312+65
SEE NOTE 2



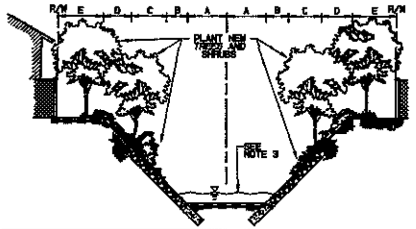
CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10	5/10							2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	1										1
BIG LEAF MAPLE									1		
CALIF. BOX ELDER											
FREMONT COTTONWOOD			1								
COAST LIVE OAK	2										3
VALLEY OAK	2										2
BLUE ELDERBERRY										2	
CALIF. BAY										1	
CALIF. BLACK WALNUT			1						1		
CALIF. SYCAMORE			2							1	
WHITE ALDER											

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)		1								1	
DWARF COYOTE BRUSH			2						2		
CEANOTHUS (CONCHA)									2		
CEANOTHUS (RAY HARTMAN)		2								2	
TOYON		1	1						1	1	
HOLLY LEAVED CHERRY	1	1								1	1
COFFEEBERRY		2	2						2	2	
PINK WINTER CURRANT			1						1		
CALIF. ROSE			1						2		
FLANNEL BUSH										1	

TYPICAL SECTION F-F STA. 313+45 TO STA. 314+75
SEE NOTE 2



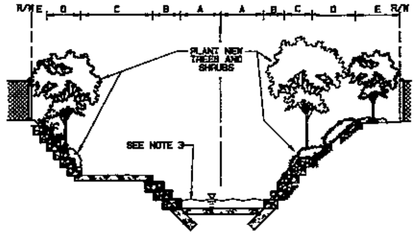
PLAN
SCALE: 1" = 50'



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10		3/10						3/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE											
BIG LEAF MAPLE			1								
CALIF. BOX ELDER									1		
FREMONT COTTONWOOD											
COAST LIVE OAK	2										2
VALLEY OAK	1										2
BLUE ELDERBERRY											
CALIF. BAY											
CALIF. BLACK WALNUT											
CALIF. SYCAMORE											
WHITE ALDER			2						2		

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	1										
DWARF COYOTE BRUSH		1								1	
CEANOTHUS (CONCHA)	1										1
CEANOTHUS (RAY HARTMAN)		1								2	
TOYON			1						1		
HOLLY LEAVED CHERRY		2								1	
COFFEEBERRY		2								3	
PINK WINTER CURRANT			1								
CALIF. ROSE			1						1		
FLANNEL BUSH											

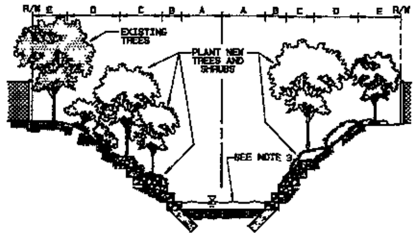
TYPICAL SECTION A-A STA. 302+00 TO STA. 303+80
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	6/10	5/10							3/10	2A/10	2B/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	2										2
BIG LEAF MAPLE										1	
CALIF. BOX ELDER		1									
FREMONT COTTONWOOD											2
COAST LIVE OAK	9										9
VALLEY OAK											1
BLUE ELDERBERRY										2	
CALIF BAY		1									
CALIF. BLACK WALNUT	2										3
CALIF SYCAMORE										1	
WHITE ALDER		1									

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	6/10	5/10	5/10						3/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)		4								4	
DWARF COYOTE BRUSH	3	2								2	3
CEANOTHUS (CONCHA)	2	2								3	2
CEANOTHUS (RAY HARTMAN)	3	3								3	3
TOYON	3	2								2	3
HOLLY LEAVED CHERRY	3	3							3		3
COFFEEBERRY	5	5							5	5	
PINK WINTER CURRANT			3						3		
CALIF ROSE			5						4		
FLANNEL BUSH		1								1	

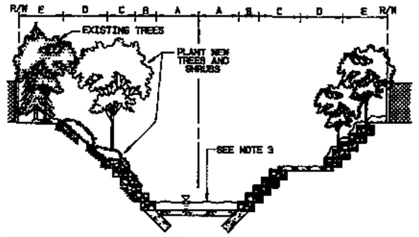
TYPICAL SECTION C-C STA. 306+00 TO STA. 310+00
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10		5/10						5/10	2A/10	2B/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE											1
BIG LEAF MAPLE									1		
CALIF. BOX ELDER									1		
FREMONT COTTONWOOD											
COAST LIVE OAK	1										
VALLEY OAK	1										4
BLUE ELDERBERRY											2
CALIF. BAY										1	
CALIF. BLACK WALNUT									1		
CALIF SYCAMORE			2						1		
WHITE ALDER											

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL		2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)											1
DWARF COYOTE BRUSH		1								2	
CEANOTHUS (CONCHA)										2	
CEANOTHUS (RAY HARTMAN)		2									1
TOYON			1						2		
HOLLY LEAVED CHERRY		1								1	
COFFEEBERRY		1	1							1	2
PINK WINTER CURRANT									1		
CALIF. ROSE			1						1		
FLANNEL BUSH										1	

TYPICAL SECTION E-E STA. 312+65 TO STA. 313+45
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10	5/10						5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	1										1
BIG LEAF MAPLE										1	
CALIF BOX ELDER										1	
FREMONT COTTONWOOD		1									
COAST LIVE OAK	3										6
VALLEY OAK	2										5
BLUE ELDERBERRY		2								1	
CALIF. BAY										1	
CALIF. BLACK WALNUT	1										1
CALIF. SYCAMORE										2	
WHITE ALDER			1								

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)		1								1	1
DWARF COYOTE BRUSH		2								2	1
CEANOTHUS (CONCHA)	2										2
CEANOTHUS (RAY HARTMAN)	1	2								4	1
TOYON			2						1	2	
HOLLY LEAVED CHERRY		2	1						1	2	
COFFEEBERRY	3	1								2	2
PINK WINTER CURRANT			1						2		
CALIF. ROSE			2						2		
FLANNEL BUSH										1	

TYPICAL SECTION G-G STA. 314+75 TO STA. 316+35
SEE NOTE 2

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

	DESCRIPTION	DATE	APPR

REFERENCE INFORMATION AND NOTES

1. TREE DATA COLLECTED 1988.
2. TYPICAL SECTIONS VIEWED LOOKING UPSTREAM.
3. TYPICAL SECTIONS SHOW ORDINARY HIGH WATER. (APPROX. ONE FOOT DEPTH)
4. TYPICAL SECTIONS NOT TO SCALE.
5. ZONES A AND B ARE LOCATED IN THE CHANNEL BOTTOM AND THE LOWER 4 FEET OF GABION CHANNEL LINING. NO REVEGETATION EFFORTS ARE PROPOSED IN THESE ZONES EXCEPT AS NOTED.

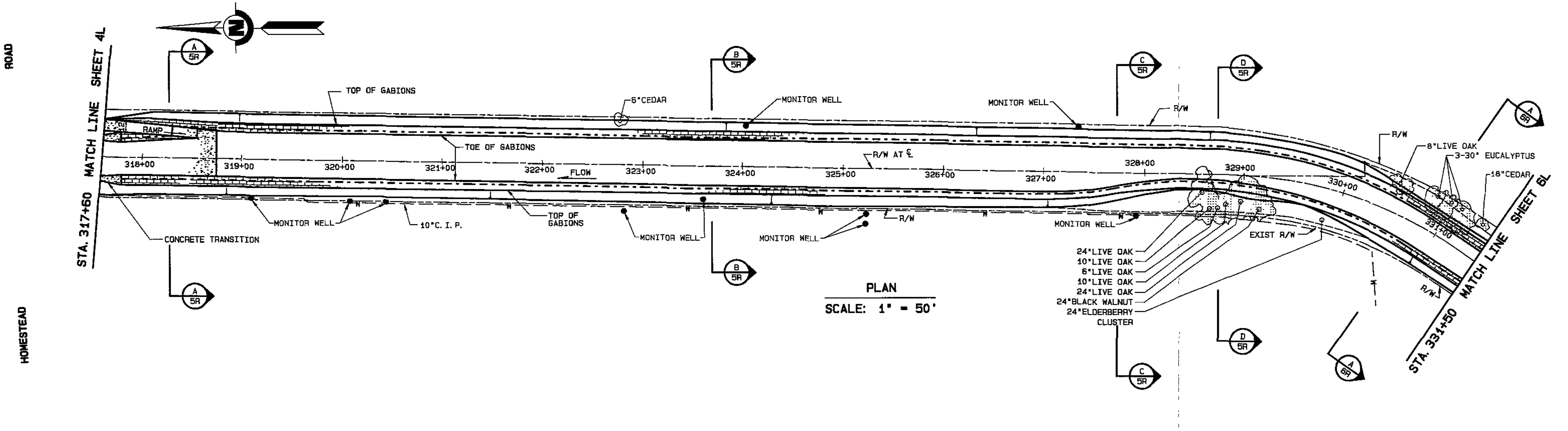
DATE 11/20/91
DESIGN KR/CM
DRAWN CM/SL
CHECKED KR

Santa Clara Valley Water District

PROJECT ENGINEER
DIVISION ENGINEER

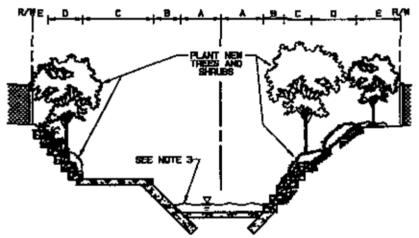
CALABAZAS CREEK
REACHES 1-8
CONCEPTUAL REVEGETATION PLANS

SCALE AS SHOWN
SHEET 4R OF 10



PLAN

SCALE: 1" = 50'

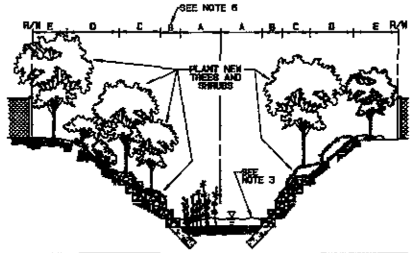


CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2A/10	5/10							5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	1										1
BIG LEAF MAPLE			1								
CALIF. BOX ELDER									1		
FREMONT COTTONWOOD			1								
COAST LIVE OAK	5										5
VALLEY OAK											
BLUE ELDERBERRY		1								3	
CALIF BAY										1	
CALIF BLACK WALNUT			2						1		
CALIF SYCAMORE									1		
WHITE ALDER									1		

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	6/10	5/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	2										1
DWARF COYOTE BRUSH		3								3	
CEANOTHUS (CONCHA)	2										3
CEANOTHUS (RAY HARTMAN)		3								4	
TOYON			3						3		
HOLLY LEAVED CHERRY	4										3
COFFEEBERRY	6										6
PINK WINTER CURRANT			2						1		
CALIF. ROSE			3						2		
FLANNEL BUSH	1										

TYPICAL SECTION A-A STA. 317+30 TO STA. 318+80

SEE NOTE 2

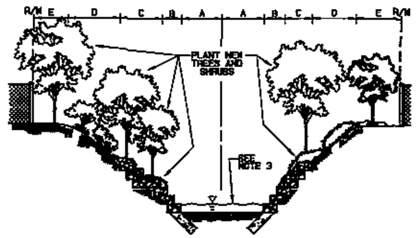


CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10	5/10						5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	7										7
BIG LEAF MAPLE			3						1		
CALIF. BOX ELDER			3						3		
FREMONT COTTONWOOD		3		20					3		
COAST LIVE OAK	28										28
VALLEY OAK	1										2
BLUE ELDERBERRY		3								4	
CALIF. BAY			2							1	
CALIF. BLACK WALNUT			8								8
CALIF. SYCAMORE			1	20					1		
WHITE ALDER			1						1		

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	9										9
DWARF COYOTE BRUSH		16								17	
CEANOTHUS (CONCHA)	15										14
CEANOTHUS (RAY HARTMAN)		20								21	
TOYON			17						16		
HOLLY LEAVED CHERRY	10	10								9	10
COFFEEBERRY	9	9								9	8
PINK WINTER CURRANT			9						9		
CALIF. ROSE			16	10					14		
FLANNEL BUSH	3										4

TYPICAL SECTION B-B STA. 318+80 TO STA. 327+00

SEE NOTE 2

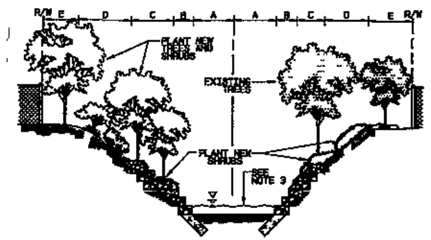


CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10	5/10						5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	2										2
BIG LEAF MAPLE			1						1		
CALIF. BOX ELDER									1		
FREMONT COTTONWOOD			3						3		
COAST LIVE OAK	9										10
VALLEY OAK										1	
BLUE ELDERBERRY		1								1	
CALIF. BAY										1	
CALIF. BLACK WALNUT		1	2						1		
CALIF. SYCAMORE			1						2		
WHITE ALDER			1						1		

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	3										3
DWARF COYOTE BRUSH	2	2								2	2
CEANOTHUS (CONCHA)	2	2								2	3
CEANOTHUS (RAY HARTMAN)	3	3	1							3	3
TOYON			5						6		
HOLLY LEAVED CHERRY	2	4								3	3
COFFEEBERRY	2	6								6	2
PINK WINTER CURRANT		2	1						2	1	
CALIF ROSE		2	2						2	3	
FLANNEL BUSH	1										1

TYPICAL SECTION C-C STA. 327+00 TO STA. 328+50

SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10	5/10								
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	1										
BIG LEAF MAPLE			1								
CALIF. BOX ELDER			1								
FREMONT COTTONWOOD											
COAST LIVE OAK	4										
VALLEY OAK											
BLUE ELDERBERRY		1									
CALIF. BAY											
CALIF. BLACK WALNUT			1								
CALIF. SYCAMORE			1								
WHITE ALDER			1								

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	1										1
DWARF COYOTE BRUSH		1	1								
CEANOTHUS (CONCHA)		2							1	1	
CEANOTHUS (RAY HARTMAN)		3								1	
TOYON		1	1						2		
HOLLY LEAVED CHERRY		2								1	1
COFFEEBERRY	4									2	
PINK WINTER CURRANT			1						4		
CALIF. ROSE			2						1		
FLANNEL BUSH	1								1		

TYPICAL SECTION D-D STA. 328+50 TO STA. 329+40

SEE NOTE 2

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

DESCRIPTION	DATE	APPR

REFERENCE INFORMATION AND NOTES

1. TREE DATA COLLECTED IN 1988.
2. TYPICAL SECTIONS VIEWED LOOKING UPSTREAM.
3. TYPICAL SECTIONS SHOW ORDINARY HIGH WATER. (APPROX. ONE FOOT DEPTH).
4. TYPICAL SECTIONS NOT TO SCALE.
5. ZONES A AND B ARE LOCATED IN THE CHANNEL BOTTOM AND THE LOWER 4 FEET OF GABION CHANNEL LINING. NO REVEGETATION EFFORTS ARE PROPOSED IN THESE ZONES EXCEPT AS NOTED.
6. ZONE B LOCATED IN THE LOWER 4 FEET OF THE GABION CHANNEL LINING ON THE LEFT BANK WILL BE REVEGETATED.

DATE 11/20/91
DESIGN KR/MM
DRAWN CM/SL
CHECKED KR

Santa Clara Valley Water District

Kenneth R
PROJECT ENGINEER

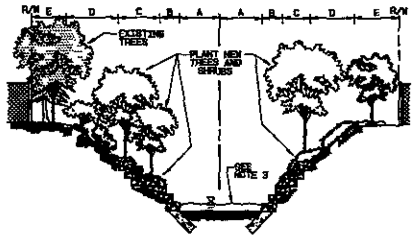
DIVISION ENGINEER

CALABAZAS CREEK

REACHES 1-8

CONCEPTUAL REVEGETATION PLANS

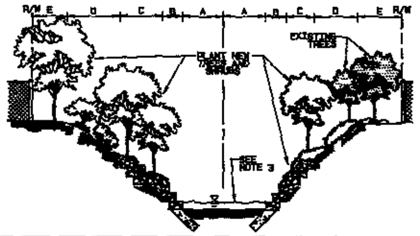
SCALE AS SHOWN
SHEET 5R
OF 10



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10							5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE											2
BIG LEAF MAPLE			1						1		
CALIF. BOX ELDER									2		
FREMONT COTTONWOOD											
COAST LIVE OAK	3										17
VALLEY OAK											2
BLUE ELDERBERRY		2								3	
CALIF. BAY		1								2	
CALIF. BLACK WALNUT			1						1		
CALIF. SYCAMORE											
WHITE ALDER									1	1	

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	3										6
DWARF COYOTE BRUSH		8								8	
CEANOTHUS (CONCHA)		5								5	4
CEANOTHUS (RAY HARTMAN)		6								7	7
TOYON			5						11		
HOLLY LEAVED CHERRY		9								10	
COFFEEBERRY	11	6								5	12
PINK WINTER CURRANT			4						5		
CALIF. ROSE			7						6		
FLANNEL BUSH	1										2

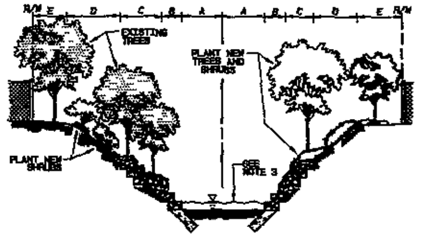
TYPICAL SECTION A-A STA. 330+50 TO STA. 334+50
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2/10	2A/10	5/10						5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	2										1
BIG LEAF MAPLE			1								
CALIF. BOX ELDER			1						1		
FREMONT COTTONWOOD			2								
COAST LIVE OAK	6										2
VALLEY OAK											1
BLUE ELDERBERRY		2								2	
CALIF. BAY											
CALIF. BLACK WALNUT			1								
CALIF. SYCAMORE									1		
WHITE ALDER			1								

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	2										1
DWARF COYOTE BRUSH		3									
CEANOTHUS (CONCHA)		3								3	
CEANOTHUS (RAY HARTMAN)	2	2								2	
TOYON			3						2	2	
HOLLY LEAVED CHERRY		4									3
COFFEEBERRY		7								6	
PINK WINTER CURRANT			2						1		
CALIF. ROSE			3						2		
FLANNEL BUSH	1									1	

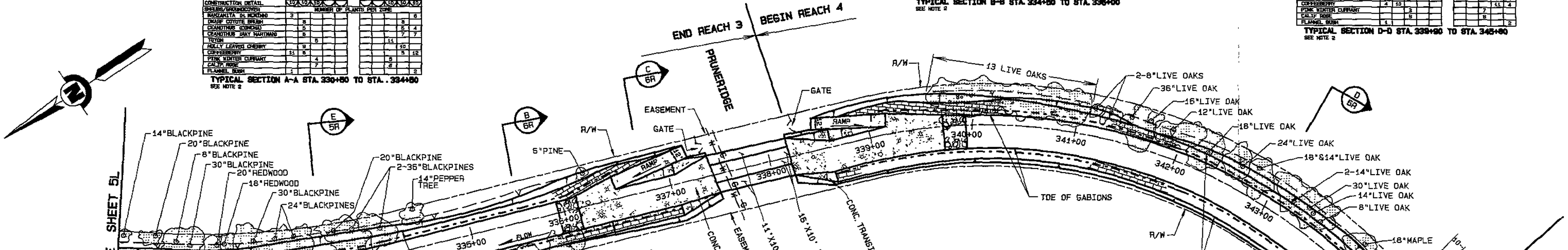
TYPICAL SECTION B-B STA. 334+50 TO STA. 336+00
SEE NOTE 2



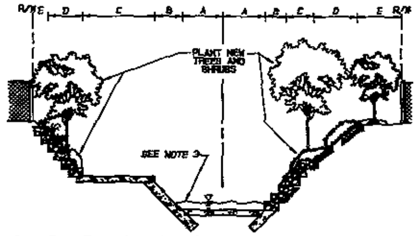
CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10							5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE											
BIG LEAF MAPLE			3						2		
CALIF. BOX ELDER			1						1		
FREMONT COTTONWOOD									3		
COAST LIVE OAK											22
VALLEY OAK											2
BLUE ELDERBERRY										3	
CALIF. BAY										2	
CALIF. BLACK WALNUT									3	2	
CALIF. SYCAMORE									2		
WHITE ALDER									2	1	

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2B/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	4										4
DWARF COYOTE BRUSH	2	3								5	3
CEANOTHUS (CONCHA)	3	3								3	3
CEANOTHUS (RAY HARTMAN)	4	4								4	5
TOYON		7	7						7	7	
HOLLY LEAVED CHERRY	4	4								5	4
COFFEEBERRY	4	10								11	4
PINK WINTER CURRANT			3						7		
CALIF ROSE			6						6		
FLANNEL BUSH	1										2

TYPICAL SECTION D-D STA. 339+90 TO STA. 345+90
SEE NOTE 2



PLAN
SCALE: 1" = 50'



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	6/10	5/10								2A/10	2B/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	2										2
BIG LEAF MAPLE		1									
CALIF. BOX ELDER		1									
FREMONT COTTONWOOD										2	
COAST LIVE OAK	6										6
VALLEY OAK	1										
BLUE ELDERBERRY		1								3	
CALIF. BAY		1								1	
CALIF. BLACK WALNUT		2								1	
CALIF. SYCAMORE											
WHITE ALDER											

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	3										2
DWARF COYOTE BRUSH		5								4	
CEANOTHUS (CONCHA)		3								5	
CEANOTHUS (RAY HARTMAN)	4	2								2	3
TOYON			5						4		
HOLLY LEAVED CHERRY	4	1								2	4
COFFEEBERRY		4								10	
PINK WINTER CURRANT			3						2		
CALIF. ROSE			4						4		
FLANNEL BUSH	1										1

TYPICAL SECTION C-C STA. 336+00 TO STA. 339+90
SEE NOTE 2

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

REV	DESCRIPTION	DATE	APPR

REFERENCE INFORMATION AND NOTES
1. TREE DATA COLLECTED 1988.
2. TYPICAL SECTIONS VIEWED LOOKING UPSTREAM.
3. TYPICAL SECTIONS SHOW ORDINARY HIGH WATER. (APPROX. ONE FOOT DEPTH)
4. TYPICAL SECTIONS NOT TO SCALE.
5. ZONES A AND B ARE LOCATED IN THE CHANNEL BOTTOM AND THE LOWER 4 FEET OF GABION CHANNEL LINING. NO REVEGETATION EFFORTS ARE PROPOSED IN THESE ZONES EXCEPT AS NOTED.

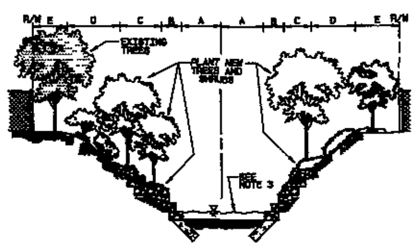
DATE 11/20/91
DESIGN KR/MM
DRAWN CM/SL
CHECKED KR

Santa Clara Valley Water District

PROJECT ENGINEER
DIVISION ENGINEER

CALABAZAS CREEK
REACHES 1-8
CONCEPTUAL REVEGETATION PLANS

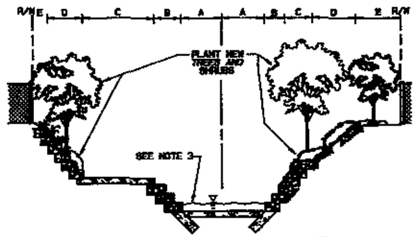
SCALE AS SHOWN
SHEET 6R OF 10



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10								2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE											1
BIG LEAF MAPLE											
CALIF. BOX ELDER									1		
FREMONT COTTONWOOD									2		
COAST LIVE OAK	1										2
VALLEY OAK											
BLUE ELDERBERRY		1								1	
CALIF. BAY											
CALIF. BLACK WALNUT											
CALIF. SYCAMORE											
WHITE ALDER											

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	1										
DWARF COYOTE BRUSH										2	
CEANOTHUS (CONCHA)		2									
CEANOTHUS (RAY HARTMAN)		1								2	
TOYON			1						1		
HOLLY LEAVED CHERRY	1										2
COFFEEBERRY		2								3	
PINK WINTER CURRANT			1								
CALIF. ROSE									2		
FLANNEL BUSH											

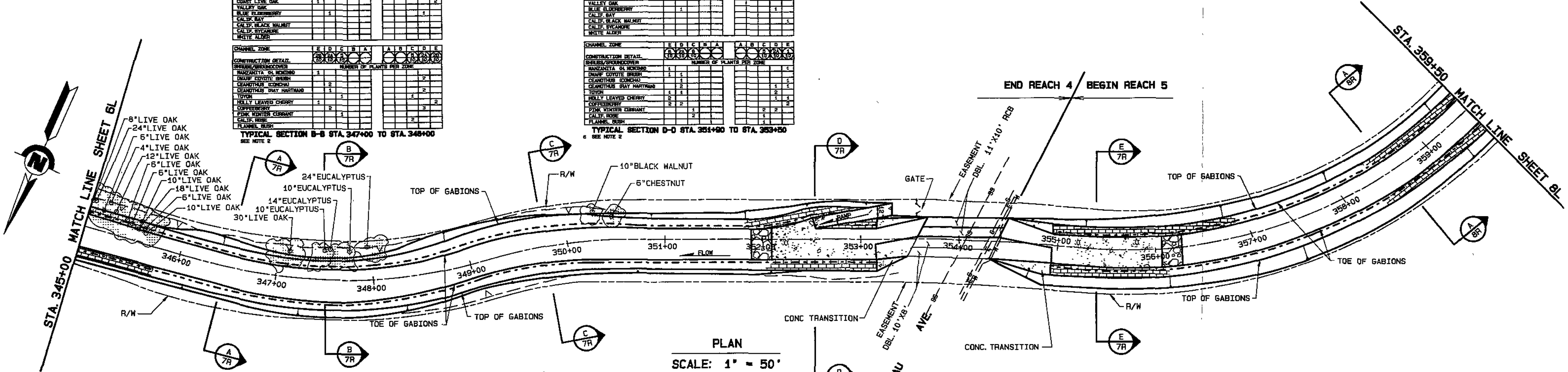
TYPICAL SECTION B-B STA. 347+00 TO STA. 348+00
SEE NOTE 2



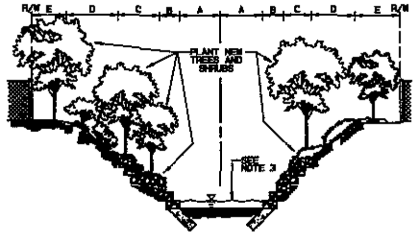
CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	6/10	5/10								2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	1										1
BIG LEAF MAPLE											2
CALIF. BOX ELDER											
FREMONT COTTONWOOD										1	
COAST LIVE OAK	3										2
VALLEY OAK											
BLUE ELDERBERRY		1								1	
CALIF. BAY											
CALIF. BLACK WALNUT											1
CALIF. SYCAMORE											
WHITE ALDER											

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	6/10	2A/10	6/10						5/10	2A/10	1/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	1										1
DWARF COYOTE BRUSH	1	1									
CEANOTHUS (CONCHA)		1									1
CEANOTHUS (RAY HARTMAN)		2								1	1
TOYON	1	1								2	
HOLLY LEAVED CHERRY	2									1	1
COFFEEBERRY	2	2									2
PINK WINTER CURRANT			1						2	2	
CALIF. ROSE			2						1		
FLANNEL BUSH									1		

TYPICAL SECTION D-D STA. 351+90 TO STA. 353+50
6 SEE NOTE 2



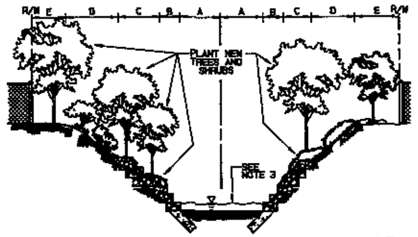
PLAN
SCALE: 1" = 50'



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10							5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	1										
BIG LEAF MAPLE											
CALIF. BOX ELDER			1						1		
FREMONT COTTONWOOD											
COAST LIVE OAK	3										2
VALLEY OAK											2
BLUE ELDERBERRY										1	
CALIF. BAY		1								1	
CALIF. BLACK WALNUT									1		
CALIF. SYCAMORE									1		
WHITE ALDER			1						1		

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	1										1
DWARF COYOTE BRUSH		2								1	
CEANOTHUS (CONCHA)		1								1	
CEANOTHUS (RAY HARTMAN)		1								2	
TOYON			2						1		
HOLLY LEAVED CHERRY	1										2
COFFEEBERRY		3								3	
PINK WINTER CURRANT			1								
CALIF. ROSE									2		
FLANNEL BUSH											

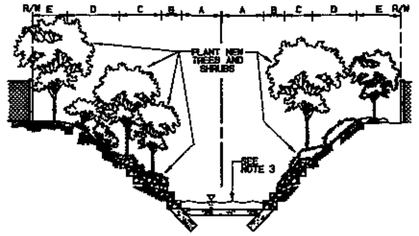
TYPICAL SECTION A-A STA. 345+80 TO STA. 347+00
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10							5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	2										2
BIG LEAF MAPLE									2		
CALIF. BOX ELDER	1										
FREMONT COTTONWOOD		3							1		
COAST LIVE OAK	8										7
VALLEY OAK	3										5
BLUE ELDERBERRY		1								3	
CALIF. BAY		1									
CALIF. BLACK WALNUT			1						2		
CALIF. SYCAMORE									2		
WHITE ALDER			1						1		

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	2										3
DWARF COYOTE BRUSH		2	2						2	2	
CEANOTHUS (CONCHA)	2	2								2	2
CEANOTHUS (RAY HARTMAN)	3	3								2	3
TOYON		2	2						2	3	
HOLLY LEAVED CHERRY	3	2								2	3
COFFEEBERRY	6	3								3	6
PINK WINTER CURRANT			2						2		
CALIF. ROSE			4						4		
FLANNEL BUSH											

TYPICAL SECTION C-C STA. 348+00 TO STA. 351+90
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10								2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	1										1
BIG LEAF MAPLE			1								
CALIF. BOX ELDER									1		
FREMONT COTTONWOOD			1								
COAST LIVE OAK	5										5
VALLEY OAK		1								1	
BLUE ELDERBERRY		1								3	
CALIF. BAY										1	
CALIF. BLACK WALNUT			1						1		
CALIF. SYCAMORE											
WHITE ALDER			1						1		

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	2	2								2	1
DWARF COYOTE BRUSH		2								3	
CEANOTHUS (CONCHA)		3								2	
CEANOTHUS (RAY HARTMAN)	2	3	1						1	4	1
TOYON			3						3		
HOLLY LEAVED CHERRY		4								3	
COFFEEBERRY		10								6	
PINK WINTER CURRANT			1						2		
CALIF. ROSE			3						2		
FLANNEL BUSH	1										

TYPICAL SECTION E-E STA. 354+40 TO STA. 355+30
SEE NOTE 2

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

REV	DESCRIPTION	DATE	APPR

REFERENCE INFORMATION AND NOTES
1. TREE DATA COLLECTED 1988.
2. TYPICAL SECTIONS VIEWED LOOKING UPSTREAM
3. TYPICAL SECTIONS SHOW ORDINARY HIGH WATER. (APPROX. ONE FOOT DEPTH)
4. TYPICAL SECTIONS NOT TO SCALE.
5. ZONES A AND B ARE LOCATED IN THE CHANNEL BOTTOM AND THE LOWER 4 FEET OF GABION CHANNEL LINING. NO REVEGETATION EFFORTS ARE PROPOSED IN THESE ZONES EXCEPT AS NOTED.

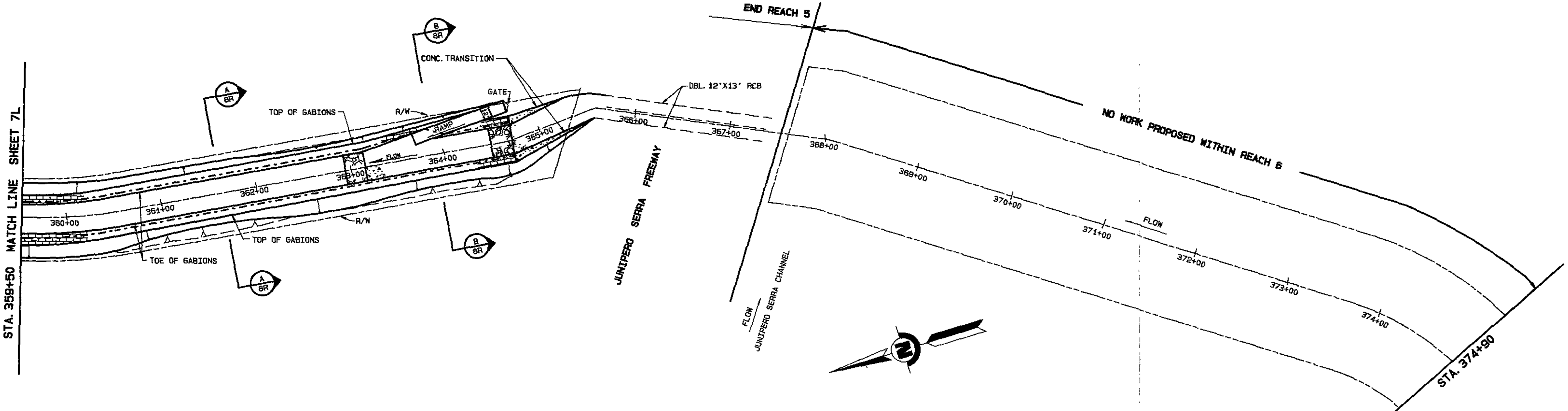
DATE 11/20/91
DESIGN KR/MM
DRAWN CM/SL
CHECKED KR

Santa Clara Valley Water District

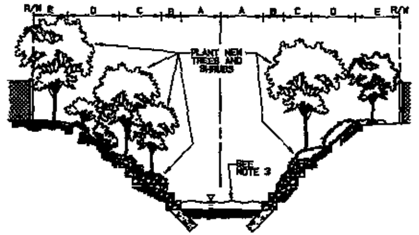
PROJECT ENGINEER
DIVISION ENGINEER

CALABAZAS CREEK
REACHES 1-8
CONCEPTUAL REVEGETATION PLANS

SCALE AS SHOWN
SHEET 7R OF 10



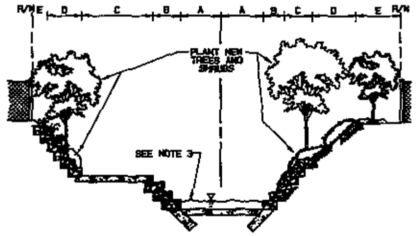
PLAN
SCALE: 1" = 50'



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10	5/10						5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	2										2
BIG LEAF MAPLE			2						3		
CALIF. BOX ELDER			3						3		
FREMONT COTTONWOOD			1								
COAST LIVE OAK	17										17
VALLEY OAK										4	1
BLUE ELDERBERRY			1							2	
CALIF. BAY		1								3	
CALIF. BLACK WALNUT			2						3		
CALIF. SYCAMORE			2						2		
WHITE ALDER			1						1		

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	5										
DWARF COYOTE BRUSH	5	5								5	5
CEANOTHUS (CONCHA)	4	5								5	5
CEANOTHUS (RAY HARTMAN)	6	7	3						3	7	8
TOYON		7	4						3	7	
HOLLY LEAVED CHERRY	5	7								8	5
COFFEEBERRY	11	11								11	11
PINK WINTER CURRANT			6						6		
CALIF. ROSE			9						10		
FLANNEL BUSH	2										2

TYPICAL SECTION A-A STA. 358+30 TO STA. 363+00
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	6/10	5/10							5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE										
CALIF. BUCKEYE	1										1
BIG LEAF MAPLE										1	
CALIF. BOX ELDER		1								1	
FREMONT COTTONWOOD											
COAST LIVE OAK	5										6
VALLEY OAK										2	2
BLUE ELDERBERRY		1									
CALIF BAY										2	
CALIF BLACK WALNUT		1								1	
CALIF. SYCAMORE											
WHITE ALDER		1							1		

CHANNEL ZONE	E	D	C	B	A		A	B	C	D	E
CONSTRUCTION DETAIL	6/10	5/10	5/10						5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE										
MANZANITA (H. MCMINN)	1										2
DWARF COYOTE BRUSH	4										3
CEANOTHUS (CONCHA)		3								3	
CEANOTHUS (RAY HARTMAN)		5							5	4	
TOYON			3						4		
HOLLY LEAVED CHERRY	2	2								2	2
COFFEEBERRY	4	4								4	3
PINK WINTER CURRANT			2						2		
CALIF. ROSE			3						3		
FLANNEL BUSH											

TYPICAL SECTION B-B STA. 363+00 TO STA. 365+40
SEE NOTE 2

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

REV	DESCRIPTION	DATE	APPR

REFERENCE INFORMATION AND NOTES
1. TREE DATA COLLECTED 1988.
2. TYPICAL SECTIONS VIEWED LOOKING UPSTREAM.
3. TYPICAL SECTIONS SHOW ORDINARY HIGH WATER (APPROX. ONE FOOT DEPTH)
4. TYPICAL SECTIONS NOT TO SCALE.
5. ZONES A AND B ARE LOCATED IN THE CHANNEL BOTTOM AND THE LOWER 4 FEET OF GABION CHANNEL LINING. NO REVEGETATION EFFORTS ARE PROPOSED IN THESE ZONES EXCEPT AS NOTED.

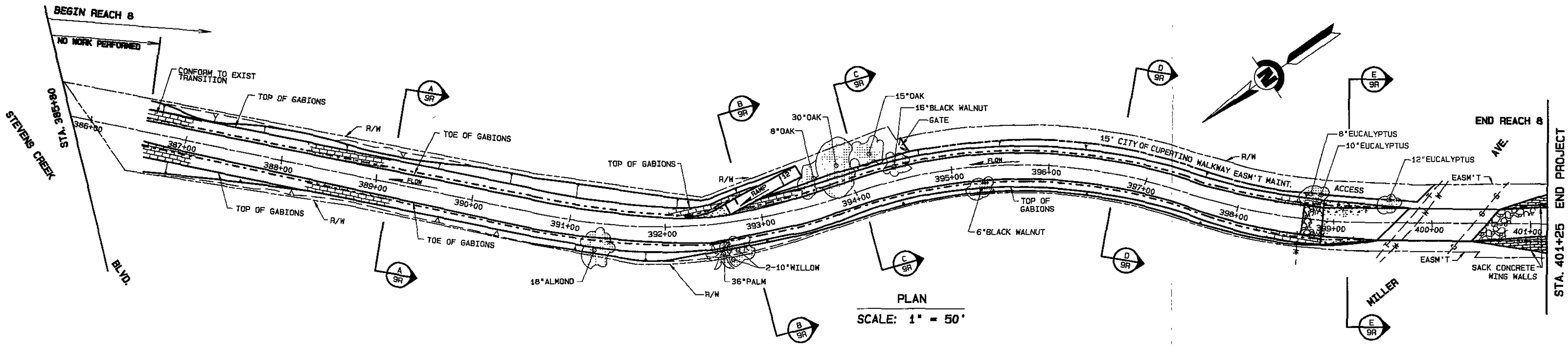
DATE 11/20/91
DESIGN KR/MM
DRAWN CM/SL
CHECKED KR

Santa Clara Valley Water District

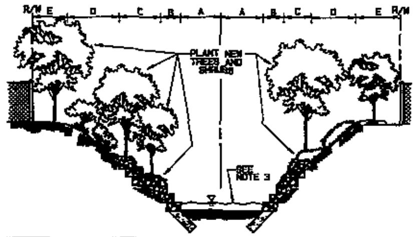
PROJECT ENGINEER
DIVISION ENGINEER

CALABAZAS CREEK
REACHES 1-8
CONCEPTUAL REVEGETATION PLANS

SCALE AS SHOWN
SHEET 8R
OF 10



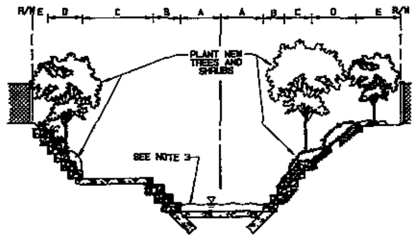
PLAN
SCALE: 1" = 50'



CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10	5/10						2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE									
CALIF. BUCKEYE	5									7
BIG LEAF MAPLE			3					2		
CALIF. BOX ELDER	5									5
FREMONT COTTONWOOD			1					1		
COAST LIVE OAK	33									34
VALLEY OAK	3									2
BLUE ELDERBERRY		4							3	
CALIF. BAY		3							2	
CALIF. BLACK WALNUT			8					9		
CALIF. SYCAMORE			3							
WHITE ALDER										

CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10					5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE									
MANZANITA DR. MCMINN	10									10
DWARF COYOTE BRUSH	9	10							10	9
CEANOTHUS (CONCHA)		8	8					8	8	
CEANOTHUS (RAY HARTMAN)		15	7					7	15	
TOYON		9	10					10	9	
HOLLY LEAVED CHERRY	11	11							11	11
COFFEEBERRY	18	20							19	18
PINK WINTER CURRANT			10					10		
CALIF. ROSE			15					15		
FLANNEL BUSH		4							4	

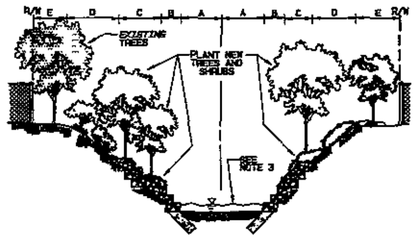
TYPICAL SECTION A-A STA. 386+50 TO STA. 392+40
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	5/10	5/10						5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE									
CALIF. BUCKEYE	2									1
BIG LEAF MAPLE									1	
CALIF. BOX ELDER									1	
FREMONT COTTONWOOD									1	
COAST LIVE OAK	8									6
VALLEY OAK										
BLUE ELDERBERRY		3							1	
CALIF. BAY		1								
CALIF. BLACK WALNUT	2								1	
CALIF. SYCAMORE									2	
WHITE ALDER									1	

CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10					5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE									
MANZANITA DR. MCMINN	2									2
DWARF COYOTE BRUSH		4							3	
CEANOTHUS (CONCHA)		3							3	
CEANOTHUS (RAY HARTMAN)		4							4	
TOYON			4					3		
HOLLY LEAVED CHERRY			4					4		
COFFEEBERRY		7								7
PINK WINTER CURRANT			2					1		
CALIF. ROSE			3					3		
FLANNEL BUSH									1	

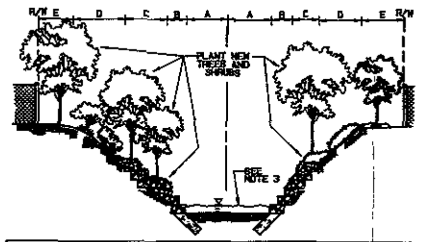
TYPICAL SECTION B-B STA. 392+40 TO STA. 393+50
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10	5/10					5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE									
CALIF. BUCKEYE	1									2
BIG LEAF MAPLE								1		
CALIF. BOX ELDER			1							
FREMONT COTTONWOOD								2		
COAST LIVE OAK	2									7
VALLEY OAK	1									
BLUE ELDERBERRY									3	
CALIF. BAY		2								
CALIF. BLACK WALNUT								3		
CALIF. SYCAMORE								1		
WHITE ALDER			1					1		

CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10					5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE									
MANZANITA DR. MCMINN	1									2
DWARF COYOTE BRUSH		3							3	
CEANOTHUS (CONCHA)		3							2	
CEANOTHUS (RAY HARTMAN)		3							4	
TOYON			3					3		
HOLLY LEAVED CHERRY		4							3	
COFFEEBERRY		7							6	
PINK WINTER CURRANT			1					2		
CALIF. ROSE			2					3		
FLANNEL BUSH								1		

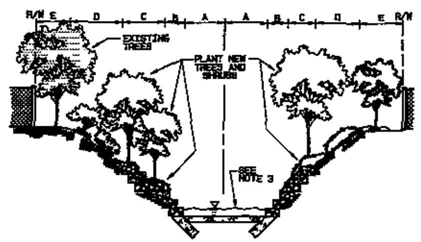
TYPICAL SECTION C-C STA. 393+50 TO STA. 394+50
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10	5/10					5/10	2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE									
CALIF. BUCKEYE	5									6
BIG LEAF MAPLE			2					1		
CALIF. BOX ELDER			3					4		
FREMONT COTTONWOOD			3					1		
COAST LIVE OAK	21									22
VALLEY OAK	1									1
BLUE ELDERBERRY		1							3	
CALIF. BAY		2							2	
CALIF. BLACK WALNUT			3					3		
CALIF. SYCAMORE			1					2		
WHITE ALDER			1							

CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10					5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE									
MANZANITA DR. MCMINN	7									7
DWARF COYOTE BRUSH	8	7							7	6
CEANOTHUS (CONCHA)		11							11	
CEANOTHUS (RAY HARTMAN)	8	7							8	8
TOYON			13					13		
HOLLY LEAVED CHERRY	6								9	7
COFFEEBERRY	7	20							20	7
PINK WINTER CURRANT			7					7		
CALIF. ROSE			11					11		
FLANNEL BUSH	3									3

TYPICAL SECTION D-D STA. 394+50 TO STA. 398+65
SEE NOTE 2



CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	1/10	2A/10							2A/10	1/10
TREES	NUMBER OF PLANTS PER ZONE									
CALIF. BUCKEYE	3									2
BIG LEAF MAPLE		1								
CALIF. BOX ELDER		1						2		
FREMONT COTTONWOOD		1								
COAST LIVE OAK	8									10
VALLEY OAK	1									
BLUE ELDERBERRY		1							1	
CALIF. BAY		1								
CALIF. BLACK WALNUT		2							3	
CALIF. SYCAMORE										
WHITE ALDER									1	

CHANNEL ZONE	E	D	C	B	A	A	B	C	D	E
CONSTRUCTION DETAIL	2B/10	2A/10	5/10					5/10	2A/10	2B/10
SHRUBS/GROUNDCOVER	NUMBER OF PLANTS PER ZONE									
MANZANITA DR. MCMINN	3									3
DWARF COYOTE BRUSH		5							5	
CEANOTHUS (CONCHA)		5							5	
CEANOTHUS (RAY HARTMAN)		3	3						3	
TOYON			5					5		
HOLLY LEAVED CHERRY		5							5	
COFFEEBERRY	6	5							5	6
PINK WINTER CURRANT			2							
CALIF. ROSE			3							
FLANNEL BUSH		1							1	

TYPICAL SECTION E-E STA. 398+65 TO STA. 399+60
SEE NOTE 2

REV	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES

1. TREE DATA COLLECTED 1988.
2. TYPICAL SECTIONS VIEWED LOOKING UPSTREAM.
3. TYPICAL SECTIONS SHOW ORDINARY HIGH WATER. (APPROX. ONE FOOT DEPTH)
4. TYPICAL SECTIONS NOT TO SCALE.
5. ZONES A AND B ARE LOCATED IN THE CHANNEL BOTTOM AND THE LOWER 4 FEET OF GABION CHANNEL LINING. NO REVEGETATION EFFORTS ARE PROPOSED IN THESE ZONES EXCEPT AS NOTED.

DATE 11/20/91
DESIGN KR/MM
DRAWN CM/SL
CHECKED KR

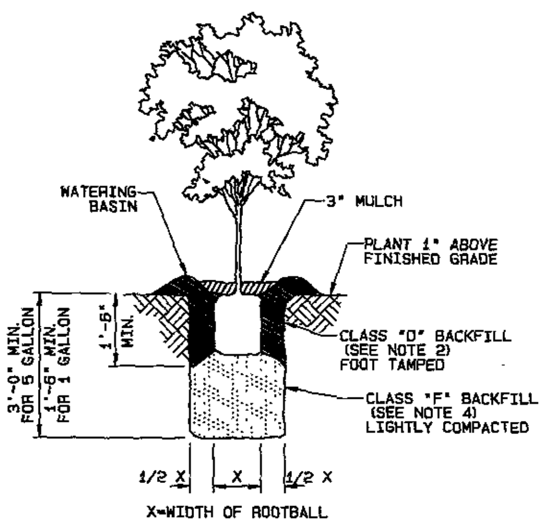
Santa Clara Valley Water District

PROJECT ENGINEER
DIVISION ENGINEER

CALABAZAS CREEK
REACHES 1-8
CONCEPTUAL REVEGETATION PLANS

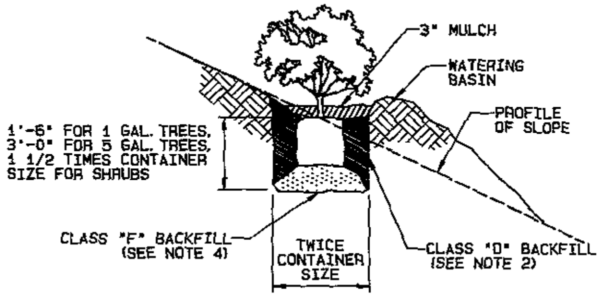
SCALE AS SHOWN
SHEET 9R OF 10

NOTE:
FOR TREE ON SLOPE-REFER TO DETAIL 2A/10 FOR PLANTING HOLE PROFILE.

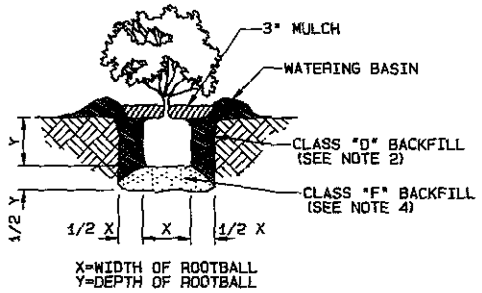

WATERING BASIN
3" MULCH
PLANT 1" ABOVE FINISHED GRADE
1'-6" MIN.
3'-0" MIN. FOR 5 GALLON
1'-6" MIN. FOR 1 GALLON
CLASS "D" BACKFILL (SEE NOTE 2) FOOT TAMPED
CLASS "F" BACKFILL (SEE NOTE 4) LIGHTLY COMPACTED
1/2 X
X
1/2 X
X=WIDTH OF ROOTBALL

1/10 TREE PLANTING-1 & 5 GALLON FLAT AREAS-TYPICAL

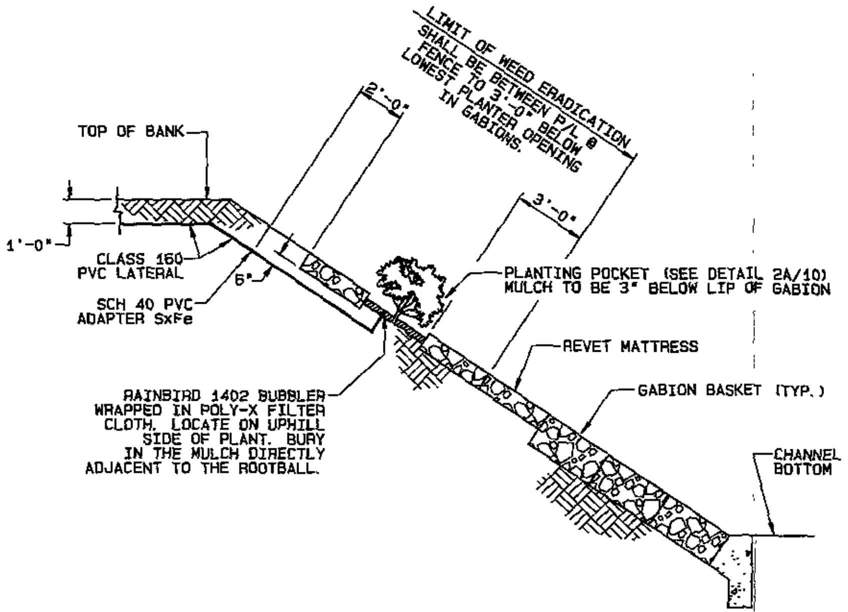
NOTE:
REFER TO TREE AND SHRUB PLANTING DETAILS FOR ADDITIONAL INFORMATION


3" MULCH
WATERING BASIN
PROFILE OF SLOPE
1'-6" FOR 1 GAL. TREES, 3'-0" FOR 5 GAL. TREES, 1 1/2 TIMES CONTAINER SIZE FOR SHRUBS
CLASS "F" BACKFILL (SEE NOTE 4)
TWICE CONTAINER SIZE
CLASS "D" BACKFILL (SEE NOTE 2)

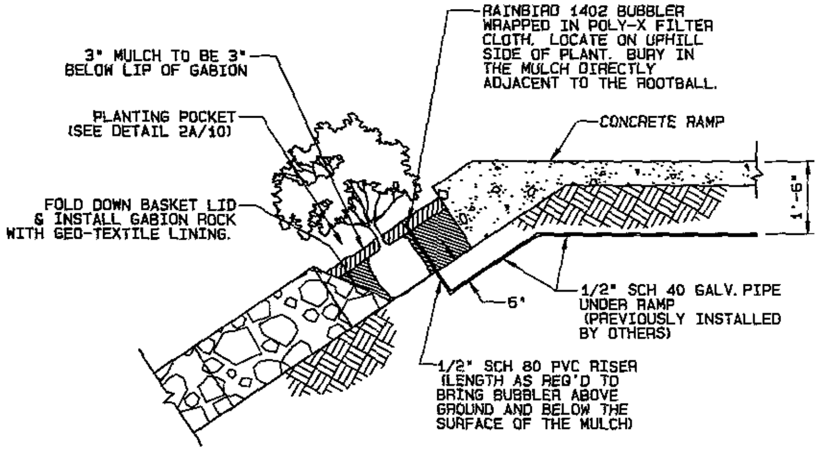
2A/10 TREE & SHRUB PLANTING SLOPE SITUATION-TYPICAL



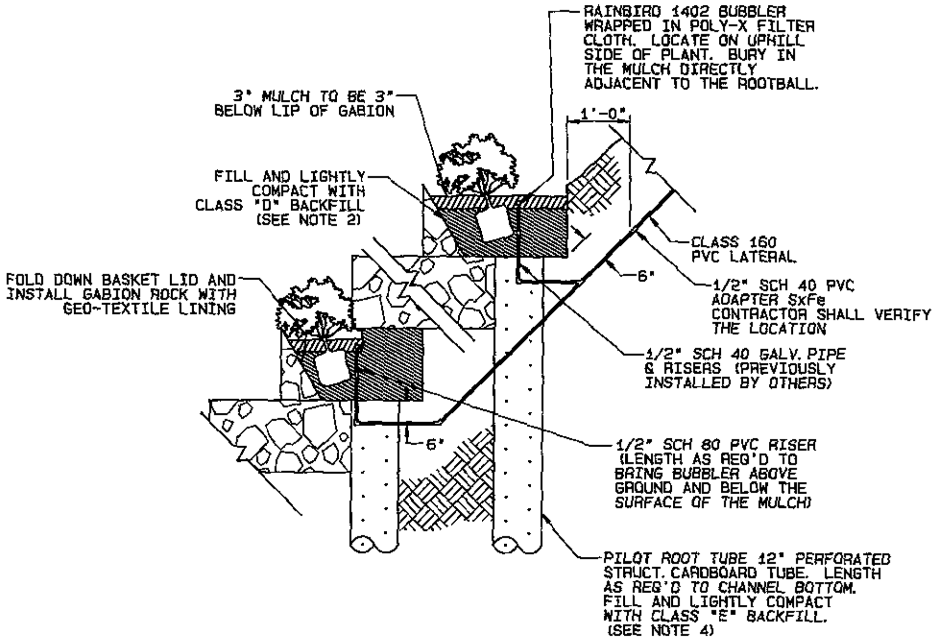
2B/10 SHRUB PLANTING FLAT AREAS-TYPICAL


LIMIT OF WEED ERADICATION SHALL BE BETWEEN P/L @ FENCE TO 3'-0" BELOW LOWEST PLANTER OPENING IN GABIONS.
2'-0"
3'-0"
TOP OF BANK
1'-0"
CLASS 160 PVC LATERAL
6"
SCH 40 PVC ADAPTER SxFe
PLANTING POCKET (SEE DETAIL 2A/10) MULCH TO BE 3" BELOW LIP OF GABION
REVET MATTRESS
GABION BASKET (TYP.)
RAINBIRD 1402 BUBBLER WRAPPED IN POLY-X FILTER CLOTH. LOCATE ON UPHILL SIDE OF PLANT. BURY IN THE MULCH DIRECTLY ADJACENT TO THE ROOTBALL.
CHANNEL BOTTOM

3/10 PLANTING/IRRIGATION AT MATTRESS GABIONS-TYPICAL

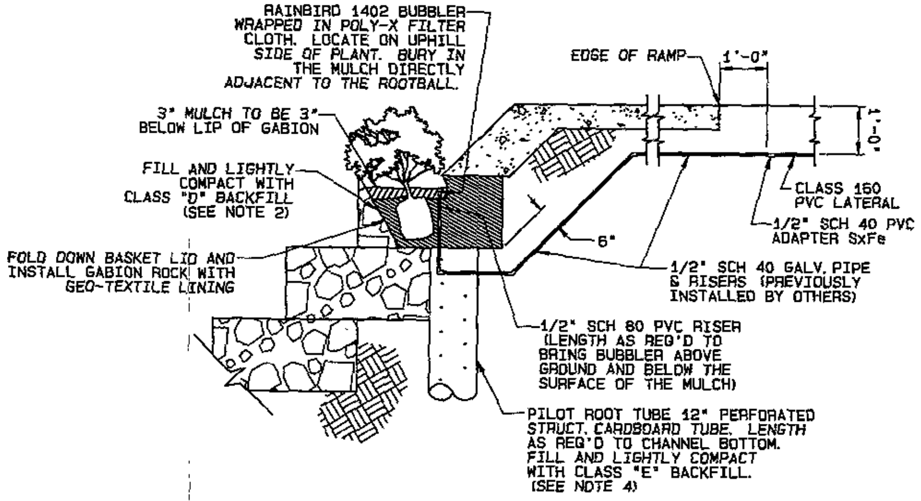

3" MULCH TO BE 3" BELOW LIP OF GABION
RAINBIRD 1402 BUBBLER WRAPPED IN POLY-X FILTER CLOTH. LOCATE ON UPHILL SIDE OF PLANT. BURY IN THE MULCH DIRECTLY ADJACENT TO THE ROOTBALL.
PLANTING POCKET (SEE DETAIL 2A/10)
CONCRETE RAMP
FOLD DOWN BASKET LID & INSTALL GABION ROCK WITH GEO-TEXTILE LINING.
1'-6"
6"
1/2" SCH 40 GALV. PIPE UNDER RAMP (PREVIOUSLY INSTALLED BY OTHERS)
1/2" SCH 80 PVC RISER (LENGTH AS REQ'D TO BRING BUBBLER ABOVE GROUND AND BELOW THE SURFACE OF THE MULCH)

4/10 PLANTING/IRRIGATION AT MATTRESS GABIONS AT RAMP-TYPICAL


RAINBIRD 1402 BUBBLER WRAPPED IN POLY-X FILTER CLOTH. LOCATE ON UPHILL SIDE OF PLANT. BURY IN THE MULCH DIRECTLY ADJACENT TO THE ROOTBALL.
3" MULCH TO BE 3" BELOW LIP OF GABION
1'-0"
FILL AND LIGHTLY COMPACT WITH CLASS "D" BACKFILL (SEE NOTE 2)
CLASS 160 PVC LATERAL
6"
FOLD DOWN BASKET LID AND INSTALL GABION ROCK WITH GEO-TEXTILE LINING
1/2" SCH 40 PVC ADAPTER SxFe CONTRACTOR SHALL VERIFY THE LOCATION
1/2" SCH 40 GALV. PIPE & RISERS (PREVIOUSLY INSTALLED BY OTHERS)
6"
1/2" SCH 80 PVC RISER (LENGTH AS REQ'D TO BRING BUBBLER ABOVE GROUND AND BELOW THE SURFACE OF THE MULCH)
PILOT ROOT TUBE 12" PERFORATED STRUCT. CARDBOARD TUBE. LENGTH AS REQ'D TO CHANNEL BOTTOM. FILL AND LIGHTLY COMPACT WITH CLASS "E" BACKFILL. (SEE NOTE 4)

5/10 PLANTING/IRRIGATION AT STEPPED GABIONS-TYPICAL

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN


RAINBIRD 1402 BUBBLER WRAPPED IN POLY-X FILTER CLOTH. LOCATE ON UPHILL SIDE OF PLANT. BURY IN THE MULCH DIRECTLY ADJACENT TO THE ROOTBALL.
EDGE OF RAMP
1'-0"
3" MULCH TO BE 3" BELOW LIP OF GABION
1'-0"
FILL AND LIGHTLY COMPACT WITH CLASS "D" BACKFILL (SEE NOTE 2)
CLASS 160 PVC LATERAL
1/2" SCH 40 PVC ADAPTER SxFe
6"
FOLD DOWN BASKET LID AND INSTALL GABION ROCK WITH GEO-TEXTILE LINING
1/2" SCH 40 GALV. PIPE & RISERS (PREVIOUSLY INSTALLED BY OTHERS)
1/2" SCH 80 PVC RISER (LENGTH AS REQ'D TO BRING BUBBLER ABOVE GROUND AND BELOW THE SURFACE OF THE MULCH)
PILOT ROOT TUBE 12" PERFORATED STRUCT. CARDBOARD TUBE. LENGTH AS REQ'D TO CHANNEL BOTTOM. FILL AND LIGHTLY COMPACT WITH CLASS "E" BACKFILL. (SEE NOTE 4)

6/10 PLANTING/IRRIGATION AT STEPPED GABIONS AT RAMP-TYPICAL

REV	DESCRIPTION	DATE	APPR

REFERENCE INFORMATION AND NOTES
1. DATA COLLECTED ON 1991
2. CLASS "D" BACKFILL SHALL CONSIST OF A MIXTURE OF SOILS AS FOLLOWS: 1 PART CLAYEY LOAM TOPSOIL, 1 PART SAND, 1 PART PEAT MOSS
3. CLASS "E" BACKFILL SHALL CONSIST OF A MIXTURE OF SOILS AS FOLLOWS: 1 PART CLAYEY LOAM TOPSOIL, 1 PART SAND
4. CLASS "F" BACKFILL SHALL CONSIST OF A MIXTURE OF SOILS AS FOLLOWS: 1 PART CLAYEY LOAM TOPSOIL, 1 PART REDWOOD COMPOST

DATE 11/20/91
DESIGN KR/MM
DRAWN SL
CHECKED KR

Santa Clara Valley Water District

Kristen Ritter
PROJECT ENGINEER
DIVISION ENGINEER

CALABAZAS CREEK
REACHES 1-8
CONCEPTUAL REVEGETATION PLANS

SCALE AS SHOWN
SHEET 10R OF 10

APPENDIX S-VII

MONITORING CHECKLIST

The following is a monitoring checklist to help ensure that the mitigations included as part of the proposed project will be carried out. Monitoring is included in accordance with revisions of CEQA regulations (Public Resource Code 21081) implemented by Assembly Bill 3180 on January 1, 1989.

	Reviewing/ Responsible Agency
1. Plans and Specifications Review	
• Revegetation plans and specifications	District, CDFG, USFWS, COE
• Floodwall aesthetic treatment	District
• Drain outlet flap gate designs	District
• Traffic control plan	District
• Construction plans and specifications—to include conditions to minimize noise, erosion, air, water quality, and toxic impacts	District, RWQCB, DOHS
2. Construction Inspection	
• Preconstruction Burrowing Owl survey (and relocation if found)	District, CDFG
• Revegetation implementation	District
• Floodwall aesthetic treatment	District
• Archeological monitoring	District
• Contamination sites	District, RWQCB, DOHS
• Traffic control plan	District
• Minimization of noise, erosion, air, water quality, and toxic impacts	District, RWQCB, DOHS
3. Postconstruction Monitoring and Maintenance	
• Habitat replacement and monitoring thereafter to comply with mitigation plans and maintenance programs	District, CDFG
• Flap gate maintenance	District
• Reach 11 secondary channel	District, CDFG

APPENDIX T

ENVIRONMENTAL IMPACT ASSESSMENT CHECKLIST INITIAL STUDY

ENVIRONMENTAL IMPACT ASSESSMENT CHECKLIST

Explanations of all "Yes" and "Maybe" answers are required on attached sheets. If impact occurs during construction or is temporary, indicate with a "C" or "T" under Yes or Maybe.

	Yes	Maybe	No
1. Geology and Soils. Will the project result in:			
a. An increased hazard to the public resulting from geologic features of the site (landslide-prone areas, faults, slumping, etc.)?			X
b. Serious disruptions, displacements, compaction, or impervious covering of the soil?	X		
c. Introduction of toxic materials in the soil or reduction of soil fertility?			X
d. Significant change in topography or ground surface relief features?			X
e. The destruction, covering or modification of any unique geologic or physical features?			X
f. Any substantial increase in wind or water erosion of soils, either on or off the site?		T	
g. Changes in siltation, sediment transport, deposition or erosion which may modify a river, stream, or other body of water?			X
2. Air. Will the project result in:			
a. Generation of air emissions (such as dust) that will seriously deteriorate air quality standards (either locally or regionally)?		C	
b. The creation of objectionable odors?			X
c. Major alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally?			X

	Yes	Maybe	No
3. Water. Will the project result in:			
a. Changes in currents, or the course or direction of water movements?			X
b. Changes in infiltration rates, sedimentation, drainage patterns, or the rate and amount of surface water runoff?			X
c. Alterations in the course or flow of floodwaters?	X		
d. An increase in downstream flood potential that might cause property damage?			X
e. Change in the amount of surface water in any body of water?			X
f. Contamination or any detrimental effect on existing water quality or quantities of either surface or subsurface supplies?			X
g. Change in the quantity of groundwaters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?			X
h. Reduction in the amount of water otherwise available for public water supplies?			X
4. Noise. Will the project increase existing noise levels during construction or operations to the extent that existing or future residents would be annoyed?	C		
5. Plant Life. Will the project result in:			
a. Change in the diversity of species, or numbers of any species of plants (including trees, shrubs, grasses, microflora, and aquatic plants)?	X		
b. Reduction of the numbers of any unique, rare or endangered species of plants?			X
c. Introduction of new plant species into an area, or a barrier to the normal replenishment of existing species?	X		

	Yes	Maybe	No
6. Animal Life. Will the project result in:			
a. Changes in the diversity of species, or numbers of any species of animals (birds, land animals, including reptiles, fish and shellfish, benthic organisms, insects or microfauna)?	X		
b. Loss or disturbance of a nesting area for resident or migrating birds?	X		
c. Reduction of the numbers of any unique, rare or endangered species of animal?			X
d. Introduction of new species of animal into an area, or result in a barrier to the migration or movement of animals (or fish)?			X
e. Deterioration of existing fish or wildlife habitat?	X		
7. Land Use/Community Plans and Values. Will the project result in:			
a. Alteration or nonconformance with regional, federal, state or local land use plans and policies of the surrounding area?			X
b. Conflict or inconsistency with adopted policies, plans and goals of the community where the project is located?			X
c. Deterioration of the integrity or quality of the surrounding neighborhood? Loss of privacy or security to residents over the long term?			X
d. Generation of a substantial public controversy resulting from environmental concerns?	X		

	Yes	Maybe	No
8. Economic. Will the project:			
a. Foster economic or population growth, either directly or indirectly, in the surrounding area (particularly if faster than planned for)?			X
b. Remove a major constraint or obstacle to growth?			X
c. Decrease employment in the community?			X
d. Reduce acreage or yield of an agricultural crop?			X
9. Population. Will the location, distribution, character, or density of the surrounding human population be altered by the project?			X
10. Housing. Will the project adversely affect existing housing or result in the relocation of existing housing?			X
11. Transportation/Circulation. Will the project result in:			
a. An adverse impact upon existing transportation systems?	T		
b. Reduction in existing parking facilities, or create demand for new parking?			X
c. Alterations to present patterns of circulation or movement of people and/or goods?	T		
d. Increase in traffic hazards to motor vehicles, bicyclists, or pedestrians?	T		
12. Public Services. Will the project result in a need for new or altered governmental services in any of the following areas:			
a. Fire or police protection?	X		
b. Schools?			X
c. Parks or other recreational facilities?			X

		Yes	Maybe	No
	d. Maintenance of public facilities (streets, highways, public transit, etc.)?	X		
	e. Flood Protection?	X		
	f. Other governmental services?	X		
13.	Utilities. Will the project result in a need for new systems, or alterations to the following utilities:			
	a. Power or natural gas?	T		
	b. Communications systems?	T		
	c. Water?	T		
	d. Sewers or septic tanks?	T		
	e. Storm water drainage?	T		
	f. Solid waste disposal?			X
14.	Energy. Will the project result in:			
	a. Use of substantial amounts of fuel or energy?			X
	b. Substantial demand upon existing sources of energy, or require the development of new sources of energy?			X
15.	Public and Environmental Health. Will the project result in:			
	a. Creation of any known human health hazard or potential health hazard (excluding mental health but including physical injury)?			X
	b. Involve the application, use, or disposal of toxic or hazardous materials?		c	
16.	Aesthetics. Will the project result in the obstruction or elimination or any scenic vista or view open to the public, or will the project result in the creation of an aesthetically offensive site or structure presently or potentially open to public view?		X	

	Yes	Maybe	No
17. Recreation. Will the project result in an impact upon the quality or quantity of existing recreational opportunities (such as fishing, boating, hiking, horseback riding, bicycling)?		X	
18. Archeological/Historical. Will the project result in an alteration of a significant known archeological or historical site, structure, object or building? Is the project in a known archeologically sensitive area?		x	
19. Natural Resources. Will the project substantially increase the consumption of an non-renewable natural resource such as minerals, precious metals, prime agricultural land, natural gas, oil, etc.?			X
20. Mandatory Findings of Significance.			
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	X		
b. Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.)			X
c. Does the project have impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environment is significant.)	X		

	Yes	Maybe	No
d. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?			X

DETERMINATION

On the basis of this Initial Study:

☐ I find the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project.

☒ I find the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

Bernard H. Goldner
Prepared by

Environmental Specialist
Title

Date: 9/12/89

DISCUSSION OF ENVIRONMENTAL EVALUATION

1.b. Permanent maintenance roads will be constructed in the channel on earth fill between the Guadalupe Slough and Highway 101. Between Lawrence Expressway and Miller Avenue the major portion of the creekbed within the limits of the project boundary will be excavated, graded and compacted.

1.f. Temporary, increased erosion will occur where soil has been disturbed. This impact will persist until these disturbed areas revegetate or become stabilized by other means. Over the long term, bank protection measures will reduce erosion.

2.a. During construction, air quality is likely to deteriorate in localized areas due to the generation of dust and exhaust emissions from construction equipment.

3.c. Upon completion of the project, floodwaters equal to or greater than the 1% (100-year) originating from Calabazas Creek will no longer inundate adjacent lands within the floodplain of this reach of the creek.

4. During construction, high noise levels are likely to disturb nearby residents located within 100 feet of the creek, with varying degrees of disturbance up to 400 feet.

5.a. Levee improvement, construction of roads, and shifting of the low flow channel will probably result in removing most of the vegetation between the levees. Mobile wildlife (e.g., birds and mammals such as raccoons and opossums) will be displaced from construction areas. Relatively immobile species (small mammals, some amphibians, mud and soil dwelling invertebrates) will be eliminated as a result of construction. These impacts would be most detrimental to wildlife if construction occurred during the spring and early summer, when most species are breeding.

Impact of construction will be short term. Under natural conditions emergent wetland and riparian vegetation are subject to scouring flood flows. The species comprising these habitat types are therefore resilient and rapid colonizers, and area able to quickly re establish themselves. Bulrush and cattails are able to re establish in one growing season if root stock remains in the soil, and willows and cottonwoods will provide good wildlife habitat after a few growing seasons.

The direct impacts of project construction between Guadalupe Slough and Lawrence Expressway are considered less than significant for two reasons. First, the impacts will be short term. Second, the project impacts are essentially the same as those resulting from regularly scheduled SCVWD maintenance activities.

Channel excavation and installation of gabions will remove most of the existing native and introduced vegetation between Lawrence Expressway and Miller Avenue. The most significant impact will be the loss of 3.5 acres of riparian vegetation including as many as 162 trees. To mitigate for this loss, approximately 8 acres of native trees and shrubs will be planted along the creek. Approximately 3,000 trees and shrubs will be planted. A Habitat Evaluation Procedure (HEP) was performed to arrive at the acreage required for mitigation.

5.c. Implementation of the proposed revegetation plan will reintroduce native riparian or streamside plants to the project site. Many of these plants at one time were rather commonly widespread along the creeks in the region. Creekbed and channel maintenance activities will restrict the spread and area of coverage of the revegetated areas.

6.a. Construction-related activities will cause wildlife to temporarily vacate the area. These species are expected to return to the creek as vegetation reestablishes. The planted species will be native, specifically selected for their wildlife habitat value. They will be planted in soil along the top of bank and within gabion baskets down the slopes of the creek channel.

6.b. The removal of up to 162 trees will reduce the habitat for tree nesting birds and other wildlife dependent on trees in some stage of the animals' life cycle. Some species may utilize the trees that will not be removed during construction. Other species may return to the creek as vegetation reestablishes, and trees and shrubs mature.

6.e. Downstream of Highway 101 impacts to fish populations will occur with the proposed project, similar to the impacts that have occurred periodically under the existing maintenance program. After the proposed project is constructed, it will provide more permanent streamside vegetation conditions in Reach 12 that would provide more continual, long-term fish cover over the existing conditions. The proposed project is designed to require less frequent removal of vegetation outside the low flow channel and less dredging in Reaches 9-11 between Guadalupe Slough and Tasman Drive. Less frequent dredging will reduce the average area available for fish.

No fish were observed in the affected sections of Calabazas Creek upstream of Lawrence Expressway during a survey conducted in May and August 1987. The fisheries potential in this part of the creek is considered to be low due to restricted flows, limited habitat and downstream barriers. Other aquatic vertebrates utilizing the creek, such as tree frogs, western toad, and garter snakes will be temporarily disturbed by construction activities in and near some sections of the creekbed.

7.d. Based on meetings with groups concerned with environmental issues, the project has created public controversy. Some neighbors have expressed concerns about the channelization of the creek and the anticipated loss of trees and vegetation, and disruption of wildlife. Others have expressed concerns about the flood control benefits achieved by channelization vs. that achieved by enlargement of certain culverts only.

11.a.,c.,d. Temporary traffic diversion and congestion caused by traffic control and/or detours may occur within the construction area. Traffic circulation will be temporarily impaired particularly at four street crossings where the culverts will be enlarged and at Kifer Road and Miller Avenue because of new bridge construction. Traffic may also be temporarily impaired by the construction of floodwalls at six crossings and adjacent to Mission College. During construction hazardous conditions will exist for vehicles and pedestrians. A traffic control plan will be developed with the cities, contractor and District.

12. Providing flood protection will reduce the need for public services associated with flooding.

13. Utilities at certain locations will require relocation during construction. Only brief disruption of service is expected to occur.

15b. There is a possibility of encountering contaminated soil or groundwater during construction. A plan (Appendix U) has been outlined to address associated issues.

16. The project will produce major changes in aesthetic values of some reaches of the creek. Some reaches of the creek will be converted from a vegetated earth channel to that of a channel largely lined with gabions. Concrete access ramps, additional culverts, fencing, gabions and uniform side slopes will impart an artificial, "man made" character to the creek. Landscaping with native riparian plant species and natural revegetation will, in time, soften

the hard plant species and natural revegetation will, in time, soften the hard bare-rock appearance of the gabions. Raised levees and floodwalls will also produce changes in visual conditions.

18. Archeological evaluations (Appendices Q & R) revealed two possible significant sites adjacent to the project area. Excavation near these areas will be monitored by a qualified archeologist.

20.a. In Reaches 9, 10, 11 and 12 the proposed project involves raising the height of the Calabazas Creek levees four feet and building maintenance roads within the channel at the base of the levees. Levee improvement, construction of roads, and shifting of the low flow channel will probably result in removing most of the vegetation between the levees. The impacts will be short term and are essentially the same as those resulting from regularly scheduled maintenance activities. The project will result in the loss of riparian habitat in Reaches 1, 2, 3, 4, 5, and 8 due to excavation, grading, and the installation of gabions and other flood control measures. Reaches 6 and 7 have already been improved and no work is proposed as part of the project.

Although some of the trees within the creekbed and along the top of bank will be preserved, about 162 or approximately 50% of existing trees of varying size and maturity will be removed. The installation of gabions and other modifications of the creek will not only change the visual character of the creek by imparting an artificial bare-rock appearance but, in some reaches, may physically limit the area in which vegetation can reestablish. The proposed revegetation program will eventually compensate to some degree for the initial loss of vegetation and, over the long term, soften the "man-made" character of the flood control channel.

20.c. Within the urbanized setting of the project area, the riparian vegetation growing along Calabazas Creek represent some of the few remnants of natural habitat in the region. Despite their fragmented and degraded condition, parts of the creek support a variety of native and non-native plants, and provide food and nesting resources to many wildlife species, especially birds. Given the relationship of the Calabazas Creek Flood Control Project to planned and proposed flood control projects in other County creeks, any continued reduction in species distribution, species composition, structure, or cover of riparian vegetation in Santa Clara County would be considered an adverse cumulative environmental impact.

APPENDIX U

GROUNDWATER AND SOILS CONTAMINATION ISSUES

Issues

The primary issue related to groundwater and soils contamination is the potential effect of construction on areas of known groundwater contamination. A second issue of potential concern is the possibility of encountering toxic substances in excavated soil. Both of these concerns are addressed in the following paragraphs.

Site Locations

There are several known contamination sites near Calabazas Creek within the study area (see Figure U-1). Because construction is expected to take place over 3 years, the status of these sites may change and new sites may be identified before construction actually occurs on any specific reach.

Responsible Agencies

Several different agencies have jurisdiction over or are involved in the groundwater contamination investigations (see Table U-1). The California Regional Water Quality Control Board (RWQCB) has jurisdiction over most groundwater contamination problems. The RWQCB issues permits for pollutant discharge under the NPDES program of the Clean Water Act and will be contacted during the design of the project.

The Santa Clara Valley Water District, as a service to the RWQCB, provides oversight for the investigation and remediation of contamination due to leaking underground fuel storage tanks.

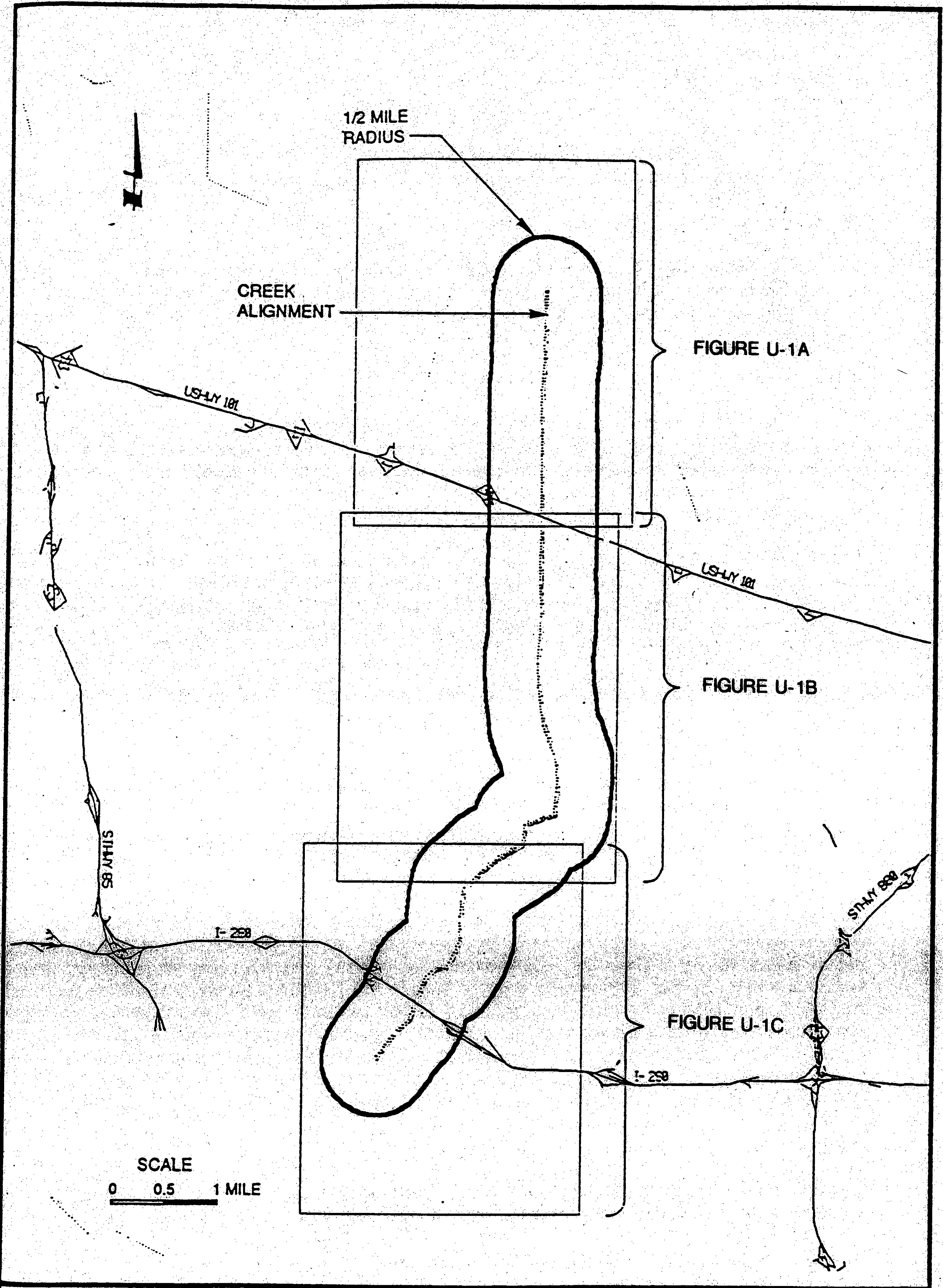
The California Department of Health Services (DOHS) Toxic Substance Control Division also has jurisdiction in many contamination cases. The DOHS administers programs for worker safety involving hazardous wastes that have been set up by both the National and State Occupational Safety and Health Administration (OSHA). Included in this appendix are the DOHS Health and Safety Plan guidelines that will be implemented should contaminated soils or groundwater be encountered.

The Environmental Protection Agency (EPA) is a federal agency responsible for administration of various laws dealing with hazardous wastes such as the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund Act), and the Superfund Amendments and Reauthorization Act (SARA). Worker safety guidelines established by SARA are very similar to those defined by the State DOHS Health and Safety Plan and are contained in 29 CFR Part 1910. Title III, Section 313 of SARA concerns toxic chemical release reporting requirements. It appears that companies manufacturing, processing, or using chemicals would be subject to Section 313 but the District would not be since it is not a manufacturer or processor of chemicals. A final determination will be made by EPA if RCRA applies to the project prior to design and construction of any reaches where encountering contaminated soil is likely.

Management Plan

A plan has been briefly outlined to address the concerns raised by the possibility of encountering contaminated groundwater or soils within the project area. The approach of the plan includes:

1. Preconstruction groundwater and soil sampling.



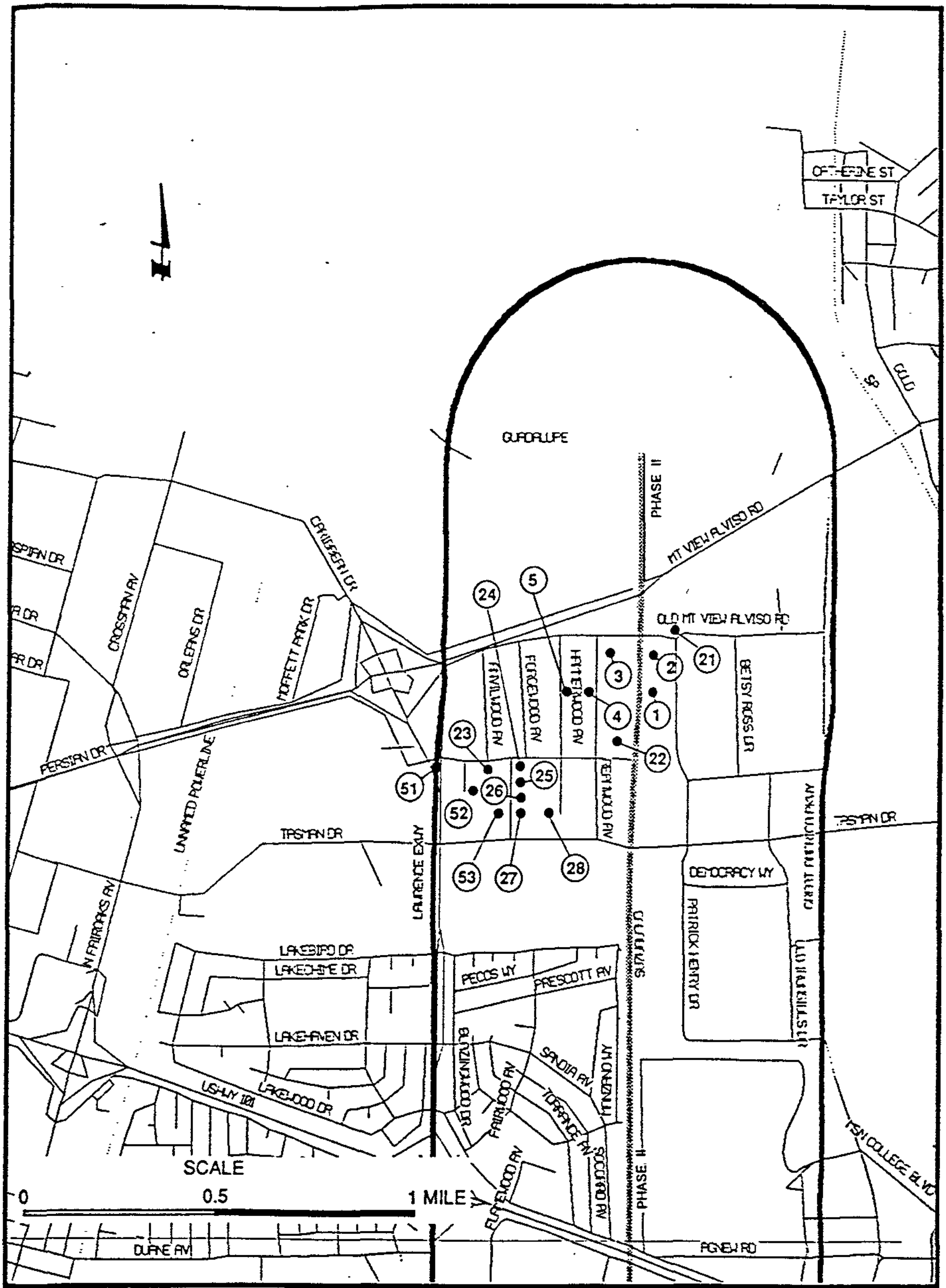
Wahler Associates

CALABAZAS CREEK

PALO ALTO • CALIFORNIA

PROJECT ALIGNMENT

PROJECT NO.	DATE	
SCV-152H	OCTOBER 1991	FIGURE U-1



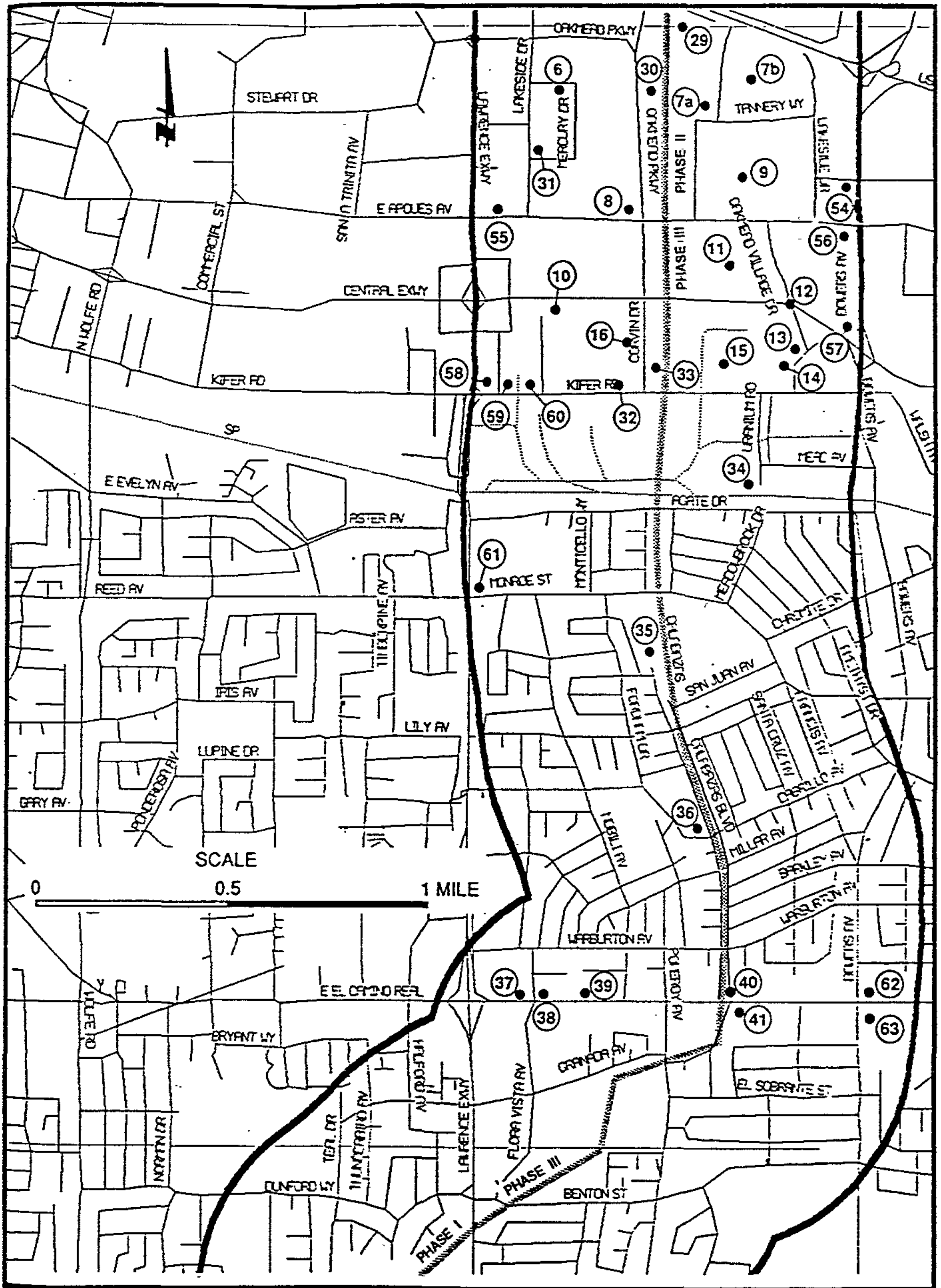
Wahler Associates

CALABAZAS CREEK

PALO ALTO • CALIFORNIA

TOXIC AND FUEL LEAK SITES

PROJECT NO.	DATE	
SCV-152H	OCTOBER 1991	FIGURE U-1A



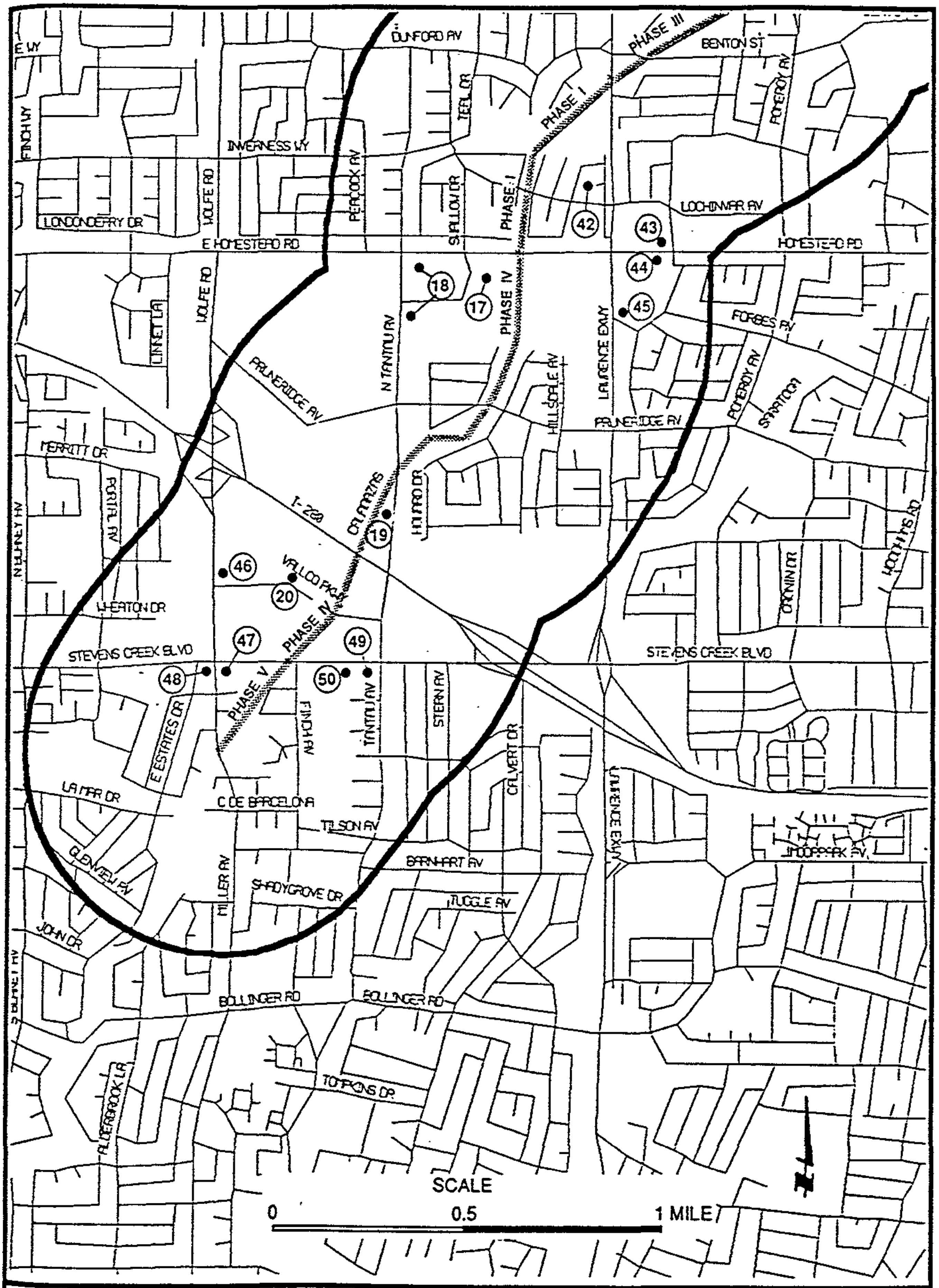
Wahler Associates

PALO ALTO • CALIFORNIA

CALABAZAS CREEK

TOXIC AND FUEL LEAK SITES

PROJECT NO.	DATE	
SCV-152H	OCTOBER 1991	FIGURE U-1B



Wahler Associates

CALABAZAS CREEK

PALO ALTO • CALIFORNIA

TOXIC AND FUEL LEAK SITES

PROJECT NO.	DATE	
SCV-152H	OCTOBER 1991	FIGURE U-1C

TABLE U-1

Regulatory Agency Contamination Cases
Within 0.5-Mile of Calabazas Creek

Sheet 1 of 4

Site Name	Site ID No.	Address	Case Type	Approximate Distance From Creek	Comments - Proposed Field Work
Dysan	1,2	5440/5200 Patrick Henry Drive	Toxic/Fuel	Adjacent East	Two (2) soil borings - C, three (3) soil borings - E, two (2) completed as MW
California Circuit Engineering	3	1292 Reamwood Avenue	Toxic	350 Feet West	One (1) soil boring - E
Western Microwave	4	1271 Reamwood Avenue	Toxic	700 Feet West	See California Cicult Engineering above
Intersil	5	1276 Hammerwood Avenue	Toxic/Fuel	1,000 Feet West	No proposed field work
Toshiba Semiconductor USA, Inc	6	1220 Midas Way	Toxic	1,500 Feet West	No proposed field work
Signetics	7a	3600 Peterson Way	Toxic	Adjacent East	One (1) soil boring - C
Signetics	7b	3625 Peterson Way	Toxic	500 Feet East	No proposed field work
Xerox	8	415 Oakmead Parkway	Toxic	500 Feet West	One (1) soil boring - C
Magnetic Peripherals	9	3333 Scott Boulevard	Toxic	1,000 Feet East	Two (2) soil borings - C
Zoran Corporation	10	3450 Central Expressway	Toxic	1,300 Feet West	No proposed field work
Koll/Oakmead Ctr & Central Expy/Oakmead Village Drive	11,12	3350 Scott Boulevard & Central Expy/Oakmeead Village Dr.	Toxic	Adjacent East	No proposed field work
Intel Magnetics (Micro Storage/Intel)	13	3000 Oakmead Village Drive	Toxic	1,500 Feet East	No proposed field work
Kimball Small Properties	14	2986 Oakmead Village Drive	Toxic	1,500 Feet East	No proposed field work
Metropolitan Corporate Center	15	3165 Kifer Road	Toxic	500 Feet East	No proposed field work
ZEP Manufacturing	16	2970 Corvin Drive	Toxic	500 Feet West	Two (2) soil borings - C, Two (2) soil borings - E, Two (2) completed as MW
American Microsystems, Inc	17	3800 Homestead Road	Toxic	Adjacent West	No proposed field work at this time May be necessary in the future
Intersil/Siemens	18	10900 North Tantau Avenue 19000 Homestead Road	Toxic	1,300 Feet West	No proposed field work at this time May be necessary in the future
Ampex	19	10435 North Tantau Avenue	Toxic	Adjacent Southeast	No proposed field work at this time May be necessary in the future

TABLE U-1

Regulatory Agency Contamination Cases
Within 0.5-Mile of Calabazas Creek

Sheet 2 of 4

Site Name	Site ID No.	Address	Case Type	Approximate Distance From Creek	Comments - Proposed Field Work
Four Phase Systems/ Tandem	20	19333 Vallco Parkway	Toxic	700 Feet West	No proposed field work at this time May be necessary in the future
Edelweiss Dairy	21	3131 Old Mountain View-Alviso Road	Fuel	500 Feet West	No proposed field work
Smiser Trucking	22	1276 Reamwood Avenue	Fuel	Adjacent West	One (1) soil boring - C
Robert Mann Packaging	23	1150 Elko Drive	Fuel	2,100 Feet West	No proposed field work
Polymetrics	24	Birchwood Drive/Elko Drive	Fuel	1,300 Feet West	No proposed field work
Marshall Engineering Corp.	25	1260 Birchwood Drive	Fuel	1,300 Feet West	No proposed field work
Hill Electrical	26	1250 Birchwood Drive	Fuel	1,300 Feet West	No proposed field work
Pacific Heating and Treatin	27	1238 Birchwood Drive	Fuel	1,300 Feet West	No proposed field work
United Parcel Service	28	1245 Hammerwood Court	Fuel	1,000 Feet East	No proposed field work
Intel	29	3200 Lakeside Drive	Toxic/Fuel	Adjacent East	One (1) soil boring - C
Babbage, Poole & Babbage	30	510 Oakmead Parkway	Fuel	Adjacent West	No proposed field work
Grossman/Gegatt Property	31	470 Lakeside Drive	Fuel	2,100 Feet West	No proposed field work
Van Den Bergh Foods	32	1484 Kifer Road	Fuel	1,000 Feet West	No proposed field work
Zycon	33	2941 Corvin Drive	Fuel	Adjacent West	One (1) soil boring - C, One (1) soil boring - E
Fayette	34	111 Uranium Road	Fuel	1,000 Feet East	One (1) soil boring - C
Wilcox High School	35	Monroe Street/Calabazas Boulevard	Fuel	Adjacent West	No proposed field work at this time May be necessary in the future
Chevron	36	3205 Cabrillo Avenue	Fuel	100 Feet West	No proposed field work at this time May be necessary in the future
Texaco	37	3501 El Camino Real	Fuel	2,100 Feet East	No proposed field work

TABLE U-1

Regulatory Agency Contamination Cases
Within 0.5-Mile of Calabazas Creek

Sheet 3 of 4

Site Name	Site ID No.	Address	Case Type	Approximate Distance From Creek	Comments - Proposed Field Work
Unocal	38	3499 El Camino Real	Fuel	1,500 Feet Northwest	No proposed field work
Tan's	39	3400 El Camino Real	Fuel	1,300 Feet North-Northwest	No proposed field work
Mobil	40	3155 El Camino Real	Fuel	50 Feet East	No proposed field work at this time May be necessary in the future
Santa Clara Glass	41	3160 El Camino Real	Fuel	200 Feet East	No proposed field work
D & E Concrete	42	1180 Lerwick Court	Fuel	1,000 Feet West	No proposed field work
Thrifty Oil	43	3501 Homestead Road	Fuel	2,100 Feet East	No proposed field work
Chevron	44	3501 Homestead Road	Fuel	2,100 Feet East	No proposed field work
Mobil	45	771 Lawrence Expressway	Fuel	1,300 Feet East	No proposed field work
J.C. Penney	46	10150 Wolfe Road	Fuel	2,600 Feet Northwest	No proposed field work
Shell	47	19480 Stevens Creek Boulevard	Fuel	500 Feet West	No proposed field work
Mobil	48	19550 Stevens Creek Boulevard	Fuel	500 Feet Northwest	No proposed field work
First Development	49,50	19110/19140 Stevens Creek Boulevard	Fuel	1,000 Feet East	No proposed field work
Chevron	51	1262 North Lawrence Expressway	Fuel	2,600 Feet West	No proposed field work
Miller	52	1248 Alderwood Avenue	Fuel	2,100 Feet West	No proposed field work
Pacific Photo Fab	53	1237 Birchwood Drive	Toxic	2,100 Feet East	No proposed field work
Shell	54	Bowers Avenue/ Augustine Drive	Fuel	2,600 Feet East	No proposed field work
Amdahl	55	1250 East Arques Avenue	Toxic	2,600 Feet East	No proposed field work
Applied Materials	56	3300 Scott Boulevard	Toxic	2,600 Feet East	No proposed field work

TABLE U-1

Regulatory Agency Contamination Cases
Within 0.5-Mile of Calabazas Creek

Sheet 4 of 4

Site Name	Site ID No.	Address	Case Type	Approximate Distance From Creek	Comments - Proposed Field Work
Applied Materials	57	3050 Scott Boulevard	Toxic	2,600 Feet East	No proposed field work
Texaco	58	1202 Kifer Road	Fuel	2,600 Feet West	No proposed field work
Pacific Technology Park	59	1266 Kifer Road	Fuel	2,100 Feet West	No proposed field work
Boise Cascade	60	1290 Kifer Road	Fuel	2,100 Feet West	No proposed field work
Shell	61	2455 Lawrence Expressway	Fuel	2,600 Feet West	No proposed field work
Shell	62	2795 El Camino Real	Fuel	2,100 Feet East	No proposed field work
Chevron	63	2798 El Camino Real	Fuel	2,100 Feet East	No proposed field work

Notes:

Site ID No. corresponds to the number preceeding the site in the text and locates the site on maps.
Case types include the following:
- Toxic - Appears on RWQCB, NPL, BEP, and/or CERCLIS toxics list(s).
- Fuel - Appears on RWQCB, Cortese, and/or SCVWD fuel leak list(s).

Explanation of Comments:
- Comment identifies proposed work to be performed on alignment in vicinity of the site during the field investigation.
- Soil boring - C = borings for combined geotechnical and environmental purposes
- Soil boring - E = borings for environmental purposes
- MW = Groundwater monitoring well

2. Monitoring and protection measures that may be needed for the workers and the adjacent community during construction.

3. *A contingency plan on how to deal with toxic substances not identified or located during* preconstruction testing but encountered during construction.

The three stage management plan has been developed to minimize the effects of construction on the existing contamination and to assure compliance with all state and federal laws. If groundwater and soil sampling indicate that encountering contaminated soil is likely, a detailed Site Specific Health and Safety Plan will be developed during final engineering design. The Site Specific Health and Safety Plan will be prepared in cooperation with the State DOHS and EPA. Following are other objectives of the design and construction program:

1. Utilization of groundwater and contamination information developed by others in conjunction with groundwater cleanup efforts.

2. Establishment of an air quality monitoring program during construction to determine what measures, if any, will be needed to protect construction workers and the adjacent community.

3. Minimize aggravation of the existing groundwater contamination problem by working cooperatively with efforts that may be in effect to clean up the groundwater.

4. Exercise special care in specifying acceptable methods of water control during construction.

5. Design the proposed facility in such a manner that community exposure to toxics is not significantly worsened.

The possibility of encountering contaminated soil is of greater concern, but is unlikely based on presently available information. To provide for a clear progression of contingency planning related to this issue, the District proposes the following steps:

1. Soil boring sampling program prior to construction.

2. Execution of agreements between the District, Property Owners, and Lessees regarding responsibility for bearing the costs of possible disposal of contaminated soil at least 6 months prior to construction. The District will not pay disposal costs.

3. Preparation of a plan outlining procedures to be taken in the event contaminated soil is discovered. This will consist of classifying the waste according to state standards, identifying appropriate disposal sites or treatments, and estimating relevant unit costs. This element should be accomplished in parallel with step 2 above.

4. Establishment of a soil monitoring program to be implemented during construction. This element of work could be incorporated into the Site Specific Health and Safety Plan previously discussed.

It is difficult to speculate on the probability of encountering contaminated soil. The District will not undertake construction until the four items of the contingency plan are completed. If contaminated soil is encountered it will be classified and disposed of at an approved site in compliance with all relevant state and federal laws.

The District is currently investigating hazardous materials along the creek alignment. This investigation is comprised of a Level I Investigation which consists of file review and field reconnaissance, and a Level II Investigation to delimit the extent of soil and groundwater contamination within limits of project construction.

The results of this investigation will be used to evaluate monitoring and protection measures necessary for the safety of workers and the adjacent community; determine the quantities of impacted materials that may be encountered during construction; and develop a plan for temporary storage and transport of impacted materials.

REQUIRED ELEMENTS OF A SITE SPECIFIC HEALTH AND SAFETY PLAN

1. Site map depicting salient features of potential hazards including delineation of on-site work zone.

2. Identification of key personnel for the project, including:
   - specific assignment for the project
   - health and safety responsibilities

3. Job hazard analysis for each work assignment at the site.

4. Summary of risk assessment for the project, including:
   - threat to workers
   - threat to nearby community (if applicable)
   - threat to environment

5. Air monitoring plan for project, including:
   - ambient air quality
   - assessment of community exposure (if applicable)
   - assessment of worker exposure

6. Personal protective equipment selected for the project.

7. Decontamination procedures for personnel and equipment.

8. Listing of general safe work practices for on-site activities.

9. Description of security measures established for the site.

10. Emergency response plans established for the project, including:
    - on-site emergencies
    - off-site emergencies
    - nearby community protection (if applicable)

11. Worker training requirements for the project.

12. Medical surveillance program for field staff, including:
    - determination that worker can use respiratory protection (if applicable)
    - determination of physical condition to withstand stresses such as heat stress
    - determination of acute exposures to hazardous substances while working on-site
    - follow-up examinations (if applicable)

13. Documentation of the various elements of safety plan and site activities.

14. Plan for material handling including a description of how materials will be containerized, labelled, and handled.

15. Description of proposed sanitation methods.

16. Description of the communication systems to be used during site activities.

APPENDIX V

MEMORANDUM OF UNDERSTANDING WITH CALIFORNIA DEPARTMENT OF FISH AND GAME FOR ROUTINE MAINTENANCE ACTIVITIES IN IMPROVED CHANNELS

RECEIVED
AUG 14 1990

SANTA CLARA VALLEY WATER DISTRICT
AND
CALIFORNIA DEPARTMENT OF FISH AND GAME
MEMORANDUM OF UNDERSTANDING
ROUTINE MAINTENANCE ACTIVITIES IN IMPROVED CHANNELS

This Memorandum of Understanding by and between the California Department of Fish and Game, hereinafter called the "Department", and Santa Clara Valley Water District, hereinafter called the "Water District", is for the purpose of delineating and defining routine maintenance activities in improved channels that shall not require further Notice and Agreement in compliance with the Fish and Game Code.

WHEREAS, the Department is required to propose modifications to construction activity pursuant to Fish and Game Code Section 1601 to the Water District, and Section 1601 provides for agreement with the Department on routine maintenance of drainage and flood control facilities; and

WHEREAS, the Department has a duty to conserve fish and wildlife resources of this State; and

WHEREAS, it is essential that the Water District perform routine maintenance activities to maintain District facilities to ensure that the facilities continue to provide the design level of flood protection to which the facilities were constructed, to protect the public's investment, to prevent loss of life and property, and to comply with local ordinances and regulations, federal flood insurance regulations, and other federally mandated programs; and

WHEREAS, it is mutually beneficial to delineate and define routine maintenance, and to establish procedures to expedite maintenance activities, and to provide for the protection of fish and wildlife habitat during such maintenance activities;

WHEREAS, nothing in this agreement shall constitute a waiver of any future or current Department claims to the use and maintenance of natural conditions under the public trust doctrine;

THEREFORE, the Department and the Water District do agree as follows:

I. DEFINITIONS

An improved channel is defined as a waterway in which significant man-made alteration has occurred to improve the passage of flood flows, including straightening and containing within constructed banks and concrete-lined, riprapped, or earth trapezoid channels with engineered banks. The waterways listed in Appendix A attached hereto are the exclusive list of improved channels as defined in this Agreement.

Routine maintenance is defined as those periodically scheduled and implemented activities necessary to maintain the structural and functional integrity of the improved channel.

Channel banks, channel bottoms, and low flow channels are defined by reference to typical cross sections of flood control channels as shown in Diagram 1 attached hereto.

II. CHANNEL MAINTENANCE

The activities identified below for improved channels listed in Appendices A and B, shall constitute routine maintenance activities by definition and shall not require further notice to, and Agreement with, the Department.

The selection and application of herbicides will conform to all applicable State and Federal E.P.A. regulations.

A. Control of weeds and grasses on maintenance roads, on the areas between top of banks and adjacent property and on floodplains or overflow channels to comply with local fire regulations by mowing, discing, hand labor or herbicide application.

B. Control of weeds, grasses, and emergent aquatic vegetation on channel bottoms and banks, and on floodplains or overflow channels to maintain channel design capacity by mowing, hand labor or herbicide application.

C. Control of weeds and grasses on maintenance roads to provide a safe travelway to conduct facility inspection and maintenance activities by mowing, discing, hand labor or herbicide application.

D. Control of weeds and grasses on levees to conduct facility inspection by mowing, hand labor or herbicide application.

E. Control of weeds and grasses in revegetated mitigation areas and landscaped areas to allow plant establishment by mowing, discing, hand labor or herbicide application.

F. Removal of vegetation, silt and debris, and other obstructions to flow in the immediate vicinity (not-to-exceed 100 feet) of the following structures (1) streamflow measuring stations; (2) box culverts and bridges; (3) storm drain outfall structures; and, (4) drop structures (energy dissipaters) to maintain the structures' design functions. Surface flowing water, if any, will be diverted from work area when using equipment in the channel.

G. Removal of woody and herbaceous vegetation with hand labor and tools on channel bottoms and channel banks to maintain channel design capacity. Channels that are to be cleared in strips in alternating years to retain habitat for wildlife, as illustrated in Diagram 2, are indicated in Appendix A under applicable M.O.U. item "GS".

H. Removal of trees or branches that are in imminent danger of falling, fallen trees, and associated debris to maintain the channel design capacity .

J. Removal of accumulated sediment, debris, rubbish, and other obstructions from channels with concrete bottoms to maintain channel design capacity.

K. Removal of accumulated sediment, debris, rubbish and other obstructions in channels with unlined channel bottoms to maintain channel design capacity. Channels that are to be cleared in strips in alternating years to retain habitat for wildlife, as illustrated in Diagram 2, are indicated in Appendix A under applicable M.O.U. item "KS".

L. Removal of accumulated sediment, debris, rubbish and other obstructions in channels with unlined channel bottoms to maintain low flow channel design capacity or when necessary, to provide fish passage or habitat identified in District environmental documents.

M. Removal of accumulated sediment, debris, rubbish, and other obstructions from sediment basins to maintain design functions as identified in Appendix B.

N. Repair of failed sections of rock, gabion, concrete-lined or sacked concrete riprap bank protection to maintain bank stabilization measures previously installed for public health safety and benefit. Surface flowing water, if any, will be diverted from work area when using equipment in the channel.

III. TIME AND MANNER OF WORK

Maintenance work shall be performed at a time and in a manner which shall meet the District's obligations to public health and safety while recognizing the need to minimize adverse impacts to fish and wildlife resources and their habitat. Periods of concern to the Department are March through June for nesting birds, and October through March for anadromous fish.

IV. REPORTING REQUIREMENTS

The Water District shall provide written notification to the Lieutenant Warden for Santa Clara County of the monthly schedule for that work tentatively proposed.

The Water District shall provide to the Regional Manager, Region 3, of the Department, written notification of maintenance projects completed within the preceding quarter (quarterly reports). A maintenance project is defined as an improved channel wherein one or more of the maintenance activities identified in this Memorandum of Understanding have been performed during any given reporting period. Due dates for submitting quarterly reports shall be as follows:

May 15 for first quarter projects	(January through March)
August 15 for second quarter projects	(April through June)
November 15 for third quarter projects	(July through September)
February 15 for fourth quarter projects	(October through December)

A fee payable to the Department shall accompany each quarterly report. The fee amount shall be in accordance with the current fee schedule, as published by the Department for work performed under an MOU, based on the number of maintenance projects completed within a calendar year.

V. AMENDMENT AND TERMINATION

This Memorandum of Understanding may be amended at any time upon written agreement of the parties. Pursuant to Section 1601, agreement of the Department was obtained by the Water District for the improved channels listed in Appendix A. If the Water District gives notice to and obtains the agreement of the Department to construct additional improved channels, in compliance with Section 1601, any such additional improved channels will be added to Appendix A by written amendment of this Agreement, and all provisions of this Agreement shall apply.

This Memorandum of Understanding may be terminated by either party at any time but no such termination shall become effective until 30 days after the party not indicating the termination has been duly notified in writing. Upon termination, the activities of the parties shall be governed by the provisions of Section 1601 of the California Fish and Game Code.

Brian Hunter
Regional Manager
Department of Fish and Game

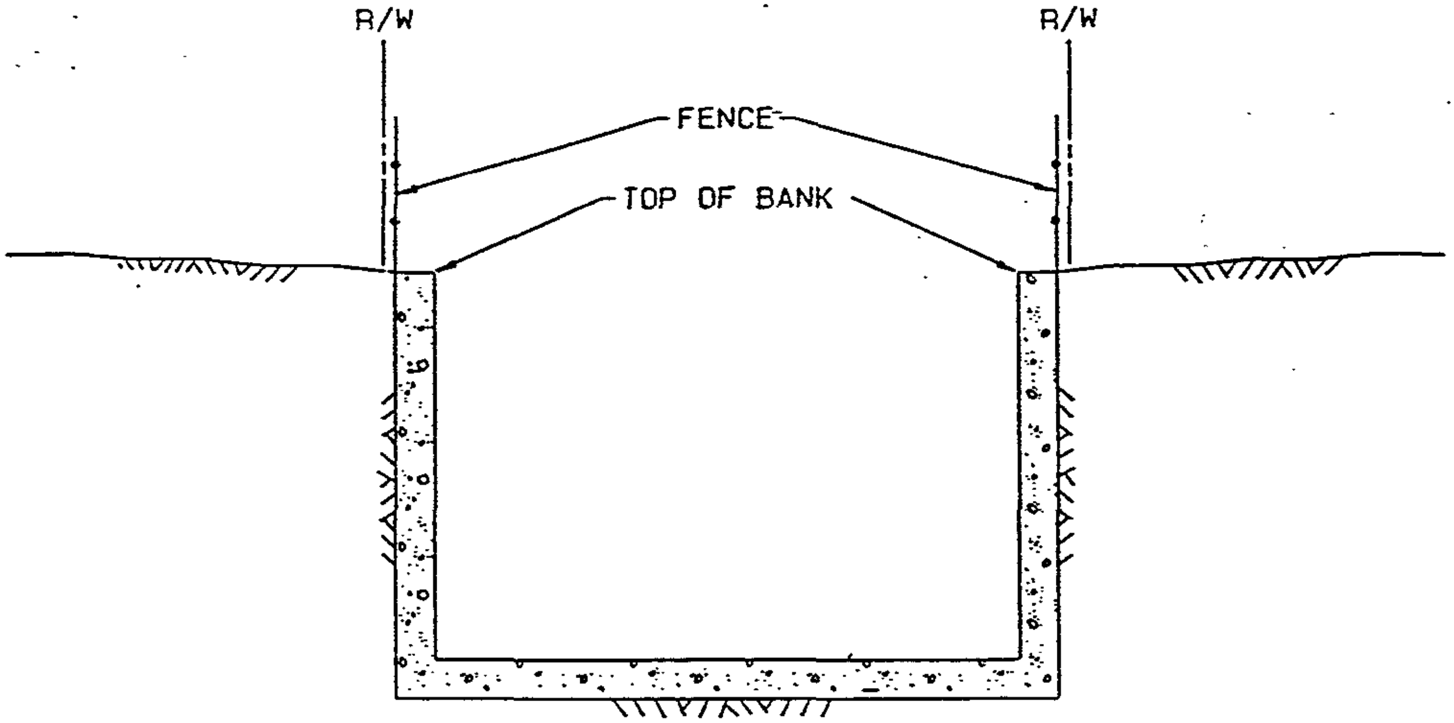
August 13, 1990
Date

Santa Clara Valley Water District
Maintenance Manager

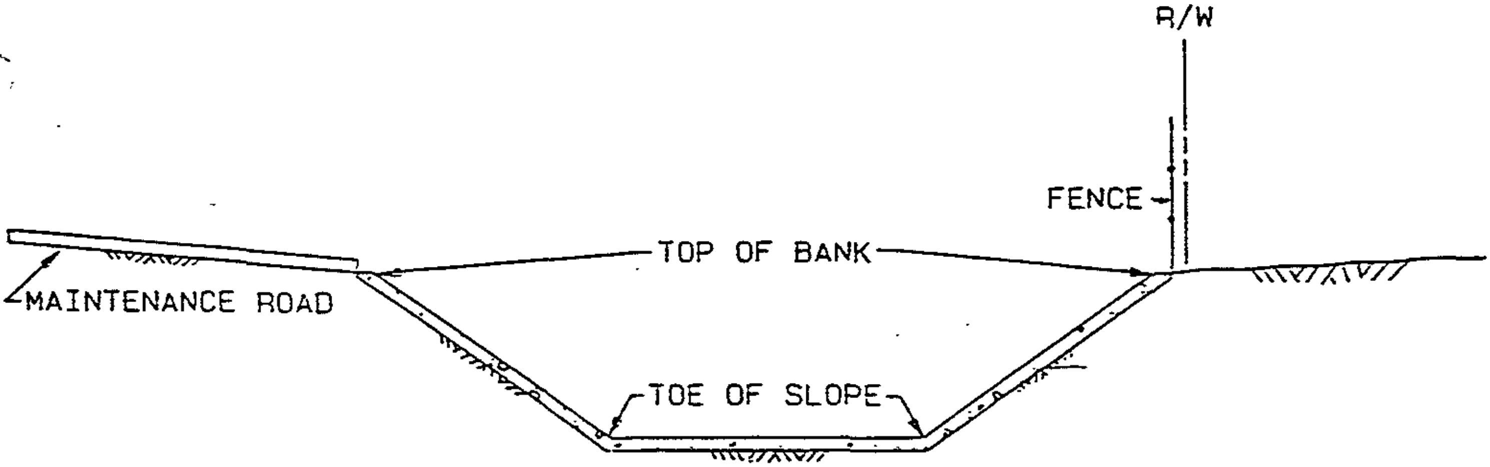
July 16, 1990
Date

Attachments

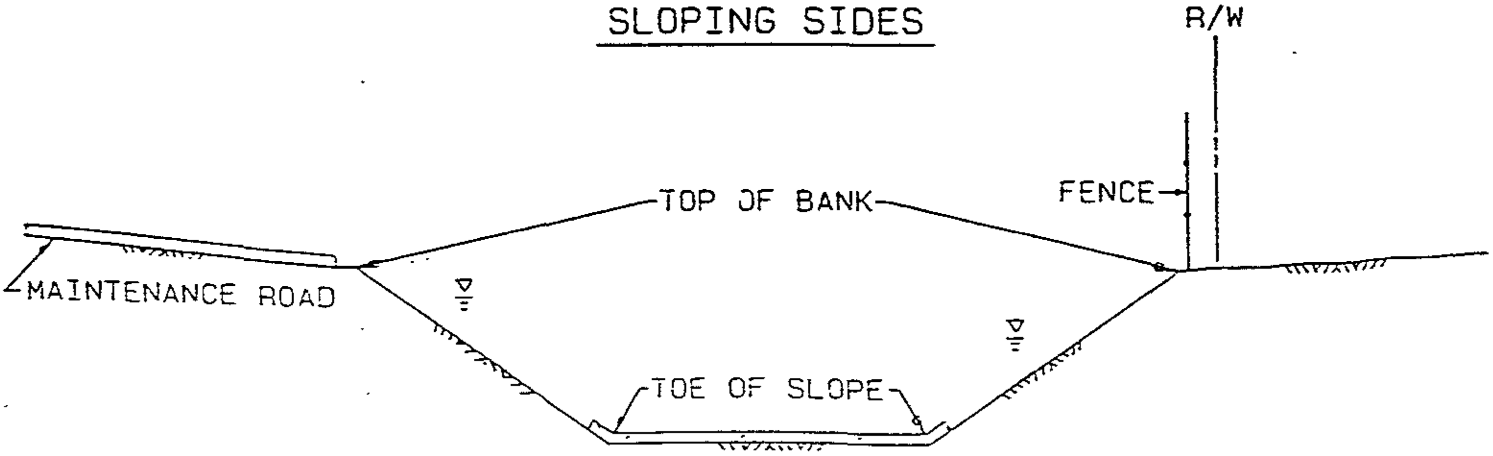
DIAGRAM NO. 1



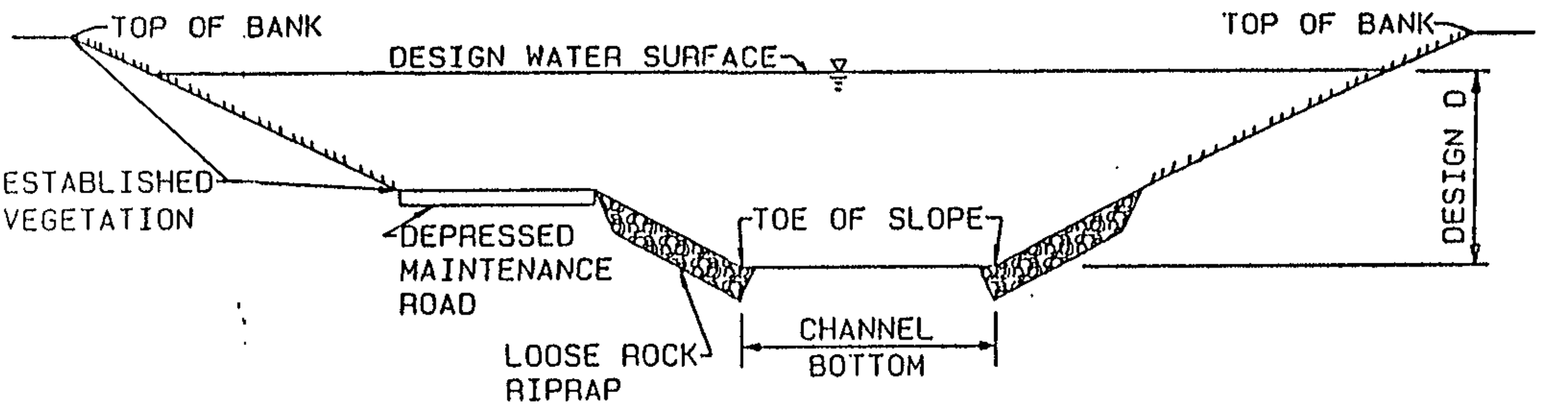
VERTICAL SIDES

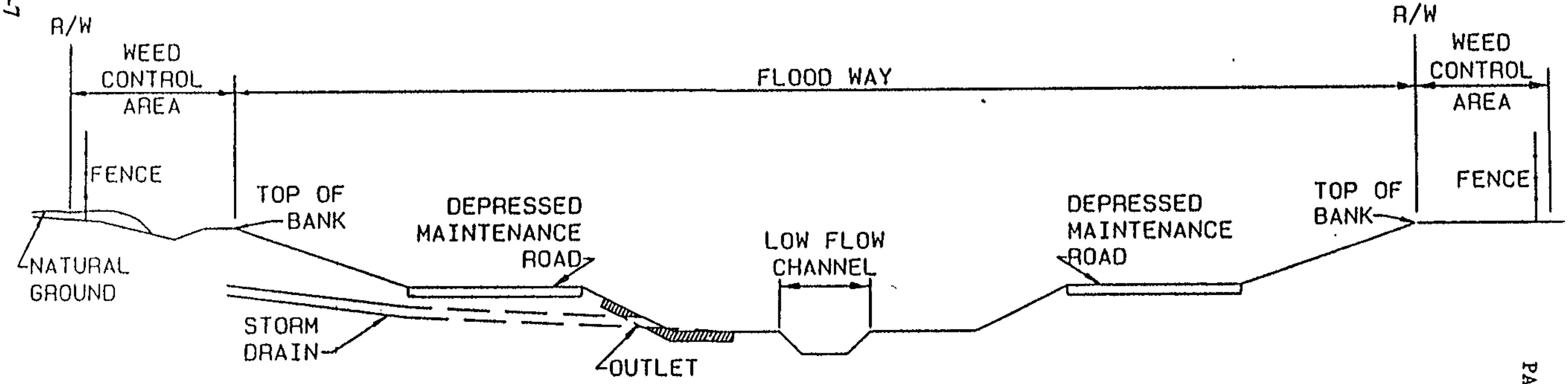


SLOPING SIDES



CONCRETE BOTTOM


TOP OF BANK
TOP OF BANK
DESIGN WATER SURFACE
DESIGN D
ESTABLISHED VEGETATION
DEPRESSED MAINTENANCE ROAD
TOE OF SLOPE
LOOSE ROCK RIPRAP
CHANNEL BOTTOM


R/W
WEED CONTROL AREA
FLOOD WAY
R/W
WEED CONTROL AREA
FENCE
TOP OF BANK
DEPRESSED MAINTENANCE ROAD
LOW FLOW CHANNEL
DEPRESSED MAINTENANCE ROAD
TOP OF BANK
FENCE
NATURAL GROUND
STORM DRAIN
OUTLET

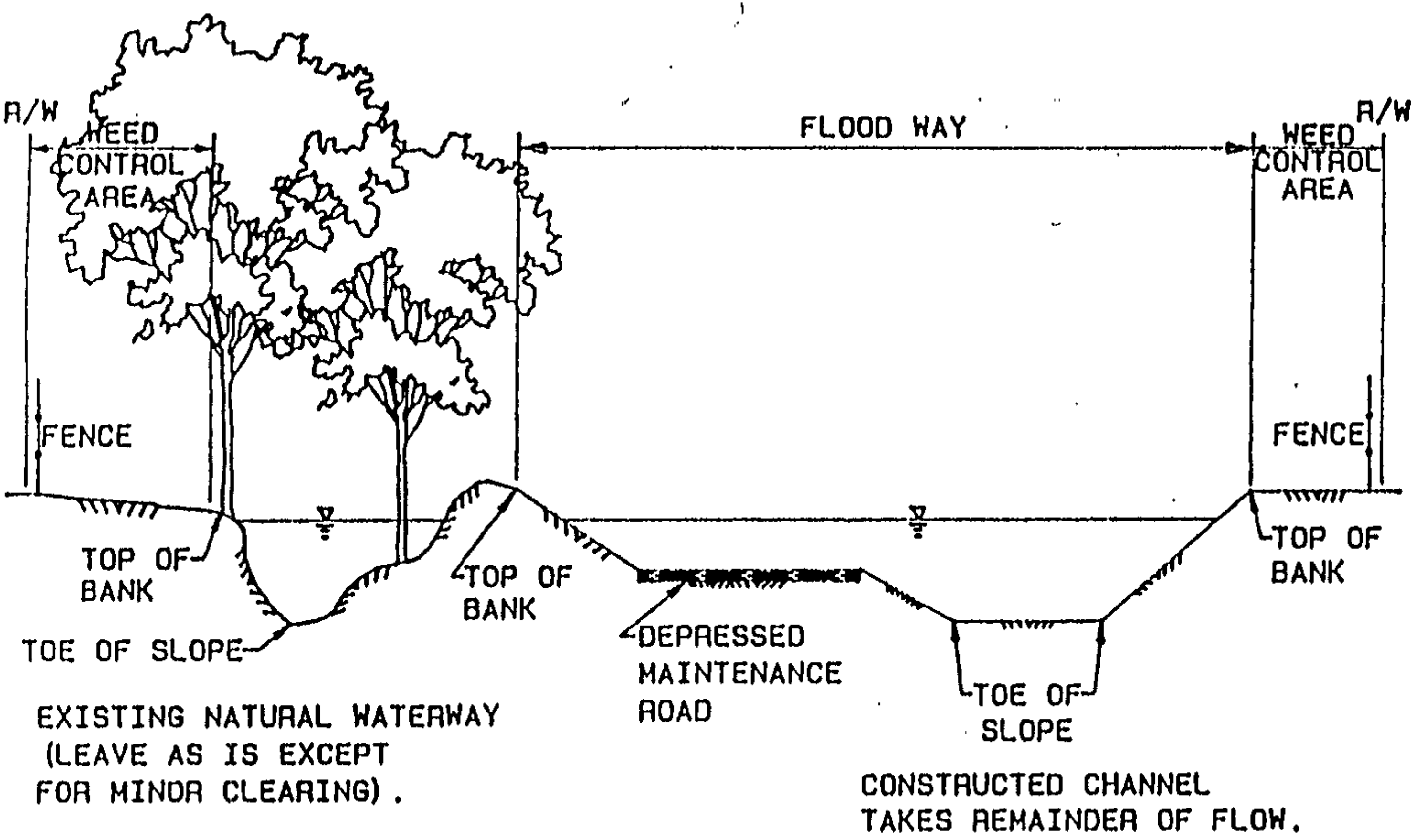
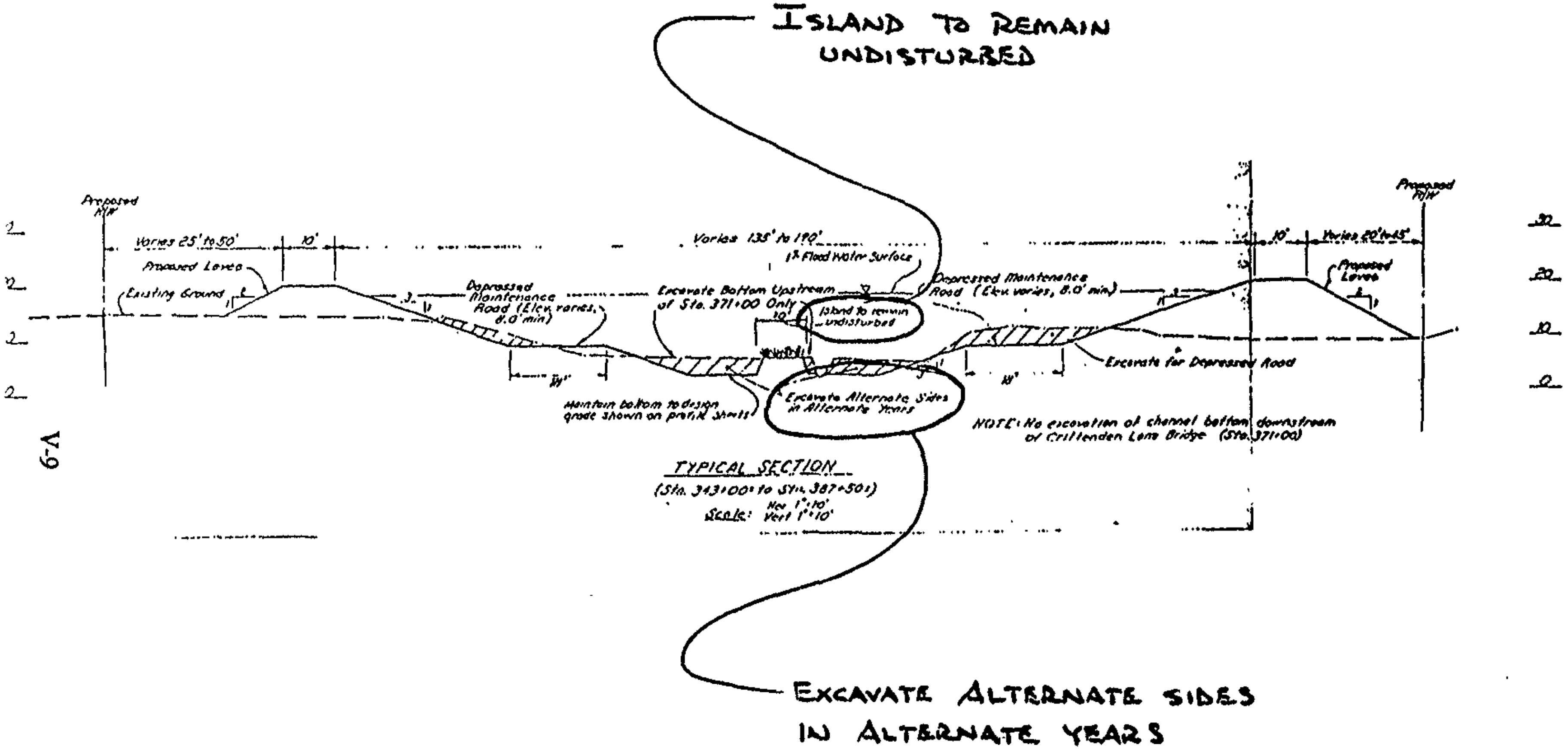

R/W
WEED CONTROL AREA
FLOOD WAY
R/W
WEED CONTROL AREA
FENCE
FENCE
TOP OF BANK
TOP OF BANK
TOP OF BANK
TOE OF SLOPE
DEPRESSED MAINTENANCE ROAD
TOE OF SLOPE
EXISTING NATURAL WATERWAY (LEAVE AS IS EXCEPT FOR MINOR CLEARING).
CONSTRUCTED CHANNEL TAKES REMAINDER OF FLOW.

DIAGRAM NO. 2


ISLAND TO REMAIN UNDISTURBED
Proposed R/W
Varies 25' to 50'
10'
Proposed Levee
Existing Ground
2
1
3
1
Depressed Maintenance Road (Elev. varies, 8.0' min)
10'
Varies 135' to 190'
1% Flood Water Surface
Excavate Bottom Upstream of Sta. 371+00 Only
10'
Island to remain undisturbed
Depressed Maintenance Road (Elev. varies, 8.0' min)
Maintain bottom to design grade shown on profile sheets
Excavate Alternate Sides in Alternate Years
10'
Excavate for Depressed Road
10'
Varies 20' to 45'
Proposed Levee
Proposed R/W
30
20
10
0
EXCAVATE ALTERNATE SIDES IN ALTERNATE YEARS

NOTE: No excavation of channel bottom downstream of Crittenden Lane Bridge (Sta. 371+00)

TYPICAL SECTION

(Sta. 343+00± to Sta. 387+50±)

Scale: Hor 1"=10'
Vert 1"=10'

APPENDIX A
NORTH CENTRAL ZONE

Creek Name - Project No.		Beg. Sta. End. Sta.	D/S Limits U/S Limits	Reach Length (ft.)	Channel Type and Related Information	Applicable M.O.U. Items
Calabazas Creek	2010	0+00 102+00	Guadalupe Slough Highway 101	10,200	Excavated Earth w/Engineered Earth Levees	A, B, C, D, F, G, H, Ks, L, N
Calabazas Creek	2010	102+00 291+60	Highway 101 Lawrence Expressway	18,960	Concrete Lined	A, C, F, G, H J, N
Calabazas Creek	2010	368+00 375+00	Highway 280 Vallco Parkway	700	Excavated Earth	A, B, C, E, F, G, H, K, L, N
Calabazas Creek	2010	375+00 385+00	Vallco Parkway Stevens Creek Boulevard	1,000	Concrete Box Culvert	E, F, G, H, J, N
Calabazas Creek	2010	444+04 446+72	Bollinger Road	268	Concrete Lined	A, B, C, F, H, J, L, N
Calabazas Creek	2010	476+91 477+92	Blaney (Drop Structure) Blaney	101	Concrete Lined	A, B, C, F, J, N
Daves Creek	2033	0+00 10+00	Los Gatos Creek Confluence Lark Avenue	1,000	Pipe	H, J
Daves Creek	2033	14+00 20+00	Wild Way Winchester Boulevard	600	Concrete Lined	A, B, C, F, H, J, N

APPENDIX W

(ADDENDUM)

COMMENTS AND RESPONSES: CALABAZAS CREEK PLANNING STUDY ENGINEERS REPORT AND FINAL ENVIRONMENTAL IMPACT REPORT

INTRODUCTION

On October 25, 1989, a public hearing was held on the Draft Environmental Impact Report for the proposed flood control project on Calabazas Creek, Guadalupe Slough to Miller Avenue. The purpose of the hearing was to receive comments from all interested parties regarding the proposed project.

Comments received at the hearing included:

1. General support for the project and a need to solve a serious flood problem.
2. Concern with regard to the necessity for a project of this magnitude.
3. Desire to minimize impacts to vegetation and fully mitigate the unavoidable impacts.
4. Site specific concerns at various locations along the project.

SUMMARY OF COMMENTS AND RESPONSES

Of the approximately 2,400 notices of a public hearing that were distributed, nine speakers and ten letters of comment were received. This addendum contains copies of all letters received, a summary or excerpt of each substantive comment, and the corresponding response by the District. The comments and responses have been grouped into state and local agencies, private interest groups, private organizations, and individual citizens. Responses to generalized comments and responses are: 1) responses to specific written comments received during the review period and 2) a summary of oral comments and responses given during the Public Hearing. This addendum also contains copies of written comments received on the Corp of Engineers Public Notice and the corresponding responses. The following page lists all the organizations and persons that commented either at the public hearing or by letter.

COMMENTS RECEIVED

1. Written Comments Received:

State Agencies

Office of Planning and Research
* Department of Fish and Game

Local Agencies

* City of Cupertino
* City of Santa Clara
* City of Sunnyvale

Private Organizations and Individuals

* Tandem Computers
* Thomas K. Wilson
* Judy-Mohr Stephens
* Jim Stallman
R. M. P. Hayes,
* Petitions from Residents near Reach 2

2. Oral Comments Made at Public Hearing:

* Jon Boyes (Tandem Computers)
* Bob Mortenson (City of Santa Clara)
* Travis Witten (City of Cupertino)
* Jim Stallman
* Wagner
* Chris Smith
* Paul Stevens
* Tom Wilson
* Amy Erickson

3. Written Comments Received on Corp of Engineers Public Notice (Public Notice is Contained in Appendix S-IV):

* National Marine Fisheries Service
* Fish and Wildlife Service
* Environmental Protection Agency

---

* Comments responded to in the Addendum

RESPONSES TO GENERALIZED COMMENTS

Comment 1: What, if anything could be done to accelerate the projected construction schedule?

Response 1: Since the June 1990 voter approval of additional flood control benefit assessments in the North Central Zone, the construction schedule has been accelerated to reduce the construction period from 12 to 4 years. Refer to Table 9.

Comment 2: The proposed project has the potential to impact existing vegetation in several areas. It is encouraged to minimize, to every extent possible, the amount of vegetation removed and fully mitigate the unavoidable losses. Revegetation should be undertaken as quickly as possible following completion of the construction, preferably the same year.

Response 2: District policy is to mitigate unavoidable impacts resulting from the project but not to enhance the environment beyond that necessary for mitigation. The District will attempt to revegetate within 1 year of completion of construction. However, revegetation is normally constrained by (1) the completion of the construction project; (2) preparation of the plans, specifications, and bid awarding; and, (3) the planting season. The revegetation will be installed when it has the greatest chance of success and survival which for California native plants is fall and early winter. Standard District practice is to require the landscape contractor to assume the revegetation project maintenance responsibility for at least 3 years. Following that, the District will assume responsibility for maintenance, monitoring, and management of the revegetation project and the irrigation systems.

The District's design and construction policy is to minimize the loss of vegetation during the construction process. This is accomplished by the preparation of plans and specifications which identify vegetation to remain and specify damages be paid by the contractor for any unauthorized removal. On-site monitoring is also used to avoid accidental damage to vegetation that should remain.

RESPONSES TO SPECIFIC WRITTEN COMMENTS

STATE AGENCIES

Department of Fish and Game

Comment 1: It is the Department's policy that projects should result in no net loss of either wetland acreage or habitat value. Review of the proposed project indicates that the project will result in the permanent loss of approximately 3.0 acres of emergent wetlands in Reaches 9, 10, and 11. This loss would be incurred by the placement of fill for depressed maintenance roads on both sides of the channel. The proposal to provide habitat areas requiring infrequent maintenance, while desirable, does not offset the impacts resulting from permanent loss of wetland areas. We recommend that the channel treatment in these reaches be modified to remove one or both of the depressed maintenance roads. If this is not feasible, new wetland acreage should be created.

Response 1: The project has been modified to comply with the Department of Fish and Game's policy of neither loss of wetland area or habitat value. The elimination of the depressed maintenance roads in Reach 9, reduction of the concrete channel linings in the vicinity of the bridges in Reaches 9, 10, and 11 reduced the loss of wetlands to 1.7 acres. The redesign of the easterly levee of Reach 9 and the adjacent levee of San Tomas Aquino Creek will create 1.7 acres of additional wetlands of comparable value to offset the lost acreage. To assist in design modifications and preparation of a mitigation and monitoring program, a wetlands determination was performed from April to June 1990. The study utilized the three parameter system and methodology outlined in the Federal Manual for Identifying and Delineating Wetlands (Federal Interagency Committee for Wetland Delineation, 1989). A copy of the Wetlands Determination Report is included in Appendix S-III.

Comment 2: No vegetation clearing for construction or maintenance should occur between March 1 and July 31 to avoid impacts to breeding birds.

Response 2: Vegetation clearing for construction during the nesting season (March through June) will not be permitted as stated in the chapter entitled "Significant Environmental Impacts and Proposed Mitigation Measures" and in Table 8, "Impacts of the Project." A statement indicating that vegetation clearing for maintenance will not be permitted during the nesting season has been added to the section entitled "Maintenance Activities." This will conform with nesting season dates in the existing Memorandum of Understanding (MOU) for maintenance of improved channels.

Comment 3: Surveys for burrowing owls should be conducted prior to reconstructing levees. If owls are found during the breeding season, work should be delayed until after the young have fledged. At other times, a plan for their relocation should be developed and implemented in consultation with the Department.

Response 3: Within Reaches 9-12, preconstruction surveys for burrowing owls and contingency planning upon their discovery is provided for as stated in Appendix S-VII, "Monitoring Checklist," Table 8, "Summary of Impacts and Mitigation Measures," and in the reach descriptions in the chapter entitled "Description of the Recommended Project."

Comment 4: In Reach 12, a proposed habitat area is indicated at the toe of the eastern levee. The Department recommends that no maintenance beyond the hand removal of downed trees and collected debris be permitted.

Response 4: No removal of sediments or vegetation will be required in the proposed habitat area in Reach 12 as indicated in Table 7, "Maintenance Standards for Sediment and Vegetation Removal." A statement prohibiting maintenance beyond hand removal of downed trees and collected debris in the proposed habitat area has been added to the Maintenance Activities Section under Reach 12.

Comment 5: Detailed revegetation plans should be prepared prior to project construction and submitted to the Department for review and approval.

Response 5: Detailed plans and specifications will be prepared to implement the riparian revegetation program for Reaches 1-8 and wetland revegetation program in Reach 9 as described in the chapter entitled "Significant Environmental Impacts and Proposed Mitigation Measures," in the reach descriptions in the chapter entitled "Description of the Recommended Project," and in Appendix S-VII, "Monitoring Checklist." The Department of Fish and Game is included in the list of reviewing/responsible agencies for monitoring of the revegetation plans and specifications.

Comment 6: Monitoring of revegetated areas should be conducted for 5 years after initial planting. Annual monitoring reports should be submitted to the Department documenting survival and condition of planted materials.

Response 6: Monitoring to evaluate success of the revegetation project will involve review by the Department of Fish and Game. The requirement for an annual report documenting survival, condition, and other determinants of success of planted material for 5 years is included in Appendix S-II.

Comment 7: The District should test the feasibility of salvaging and replanting trees which would be removed during construction.

Response 7: The District has investigated the feasibility of relocating existing trees which would be removed by construction of the proposed project. The costs of relocating larger trees is extremely high and success cannot be ensured. Discussion of this issue has been added to the chapter entitled "Significant Environmental Impacts and Proposed Mitigation Measures."

LOCAL AGENCIES

City of Cupertino

Comment 1: The City desires that the flooding problems be solved as soon as possible and would support a financing plan to accelerate this work.

Response 1: See response to General Comments No. 1.

Comment 2: The project should be extended to Route 85 so as to address possible impacts of that project on the floodplain.

Response 2: The reach of Calabazas Creek upstream of Miller Avenue which passes through the Route 85 corridor has the next highest priority in the North Central Zone for study and construction. A study of that reach is in progress.

City of Santa Clara

Comment 1: The City desires that the flooding problems be solved as soon as possible and would support a financing plan to accelerate this work.

Response 1: See response to General Comments No. 1.

Comment 2: The City of Santa Clara is also concerned that the District's flood control projects be constructed in the most economic manner consistent with appropriate environmental protection. In this regard, some of the Council expressed their concern regarding the need and added expense to accommodate both a natural channel and a gabion-lined channel in the Reach 1 area between Lawrence Expressway and Lochinvar Avenue. Having a short isolated reach of natural channel so far upstream is inconsistent and out of character with the planning and improvement for Calabazas Creek. Only this short reach in the 7.6 miles of channel improvement would have this natural channel.

Response 2: The most appropriate environmental protection as defined by the California Department of Fish & Game, the U. S. Environmental Protection Agency and the U. S. Army Corps of Engineers who administer Section 404 of the Clean Water Act under which this project must be permitted is avoidance of impacts. In order to satisfy that criteria and provide flood protection, the bypass concept is necessary.

INDIVIDUALS AND PRIVATE ORGANIZATIONS

Tandem Computers

Comment 1: The potential for business interruption and property damage caused by flooding is of extraordinary concern. The perpetual erosion of the banks and unsightly character of the waterway fosters continued loss of real estate and a true eyesore for our employees and the community. We are willing to work with the District to accelerate the project.

Response 1: The project will provide for flood protection up to at least the 1 percent flood event and for stable channel banks. The project includes a revegetation element to mitigate environmental impacts which will also provide aesthetic enhancement.

Comment 2: We would like to encourage the use of stepped gabions in Reach 5.

Response 2: The plan has been revised to include stepped gabions in Reach 5 in lieu of mattress gabions.

Comment 3: We would suggest relocating the proposed channel access ramp at Tantau Avenue to I-280.

Response 3: The plan has been modified to relocate the proposed channel access ramp.

Thomas K. Wilson

Comment 1: I have serious concerns about the environmental impact of the extensive channelization portion of the project. I feel the project should be predominately limited to (1) increasing the flow capacity of culvert; (2) widening significant neckdowns; and, (3) protecting trees which are at risk from erosion.

Response 1: One of the alternative measures investigated during the study was to limit the project to those areas which did not have 1 percent flood capacity or which were experiencing severe erosion. Only two small reaches totaling about 1,250 feet are adequate to pass the 1 percent flood and are not currently experiencing severe erosion. Soil types in these reaches are considered susceptible to erosion at expected flow velocities. The streambanks in these reaches are expected to fail eventually. This alternative is not recommended because unit costs are higher and revegetation will be fragmented.

Comment 2: The entire project should be reviewed to preserve as many additional trees and plants as possible. Trees and plants to be saved should be identified on the plans.

Response 2: Each tree of 4-inch diameter or greater within the existing or proposed right of way has been located. The project has been aligned to minimize tree loss.

Comment 3: The oak trees on the westerly side of the reach between Lochinvar and Homestead should be preserved per Sheet 29A of the draft plan.

Response 3: We understand the desire of residents along the creek to preserve these valuable trees. District staff developed the alternative design, shown on Sheet 29A in the draft report, with the objective of saving as many of the existing oak trees as possible. A typical section showing this alternative is included in the letter of response to the resident's petition which is contained in this Appendix. It is the opinion of District staff that the alternative design is inferior to the proposed design. It does not appear that there is a feasible way to save the trees, provide protection from the 100-year flood, be equitable to residents along both sides of the creek, and provide for a future high quality habitat. The alternative design has consequently been dropped in favor of the proposed plan shown on Sheet 29 of the plates. A more detailed discussion on the evaluation of this alternative is contained in the section entitled "Alternatives Feasibility and Their Significant Impacts."

Comment 4: The 3 liquidambars and pittosporums as well as the birch trees (designated to remain) along my back fence should remain.

Response 4: The 3 liquidambars and the pittosporums are near outside edge of the construction envelope and can probably be left. Depending upon the existing bank configuration, some root damage may occur during construction. Permits should be obtained before planting in the flood control right of way.

Comment 5: The channel should be shifted easterly a minimum of 10 feet along my property so as to provide protection for the plants along my fence identified previously.

Response 5: The existing right of way in this reach is just sufficient to accommodate the proposed channel with a small top of bank. A stepped gabion section has been proposed adjacent to your home to maximize top of bank area and protect the large bishop pine and redwood trees on the west bank. The minimum distance between the right of way line and the earth slope is 2 feet.

Comment 6: Project contractors should be monitored intensively to ensure the protection of maximum vegetation and all plants identified on plans as to remain.

Response 6: Contractors are monitored by the District and are liable for damages to trees which have been identified as to remain.

Comment 7: A comprehensive plan to monitor and ensure the implementation rapid growth and long term success of the planned mitigation should be developed.

Response 7: A monitoring plan to ensure the success of the mitigation is included in Appendix S-VII.

Comment 8: Further study of methods to minimize the environmental impact to Calabazas Creek should be made.

Response 8: We investigated many alternatives. Several, such as upstream storage, off-stream storage, or nonstructural alternatives were technically or economically infeasible. The cost to purchase vacant orchard lands for off-stream storage alternatives is overwhelmingly expensive considering the amount of land that would be required. However, five alternatives, for Reaches 1-8, were feasible and ranged in cost from $8.3 to 10.3 million. They are summarized in Table 6 of the Engineer's Report. A more detailed discussion on the evaluation of various alternatives is contained in the section entitled "Alternatives Feasibility and Their Significant Impacts." The proposed project will preserve and protect nearly 50 percent of the trees along the creek. Those that must be removed will be mitigated with an extensive revegetation program to reestablish as much of the aesthetic and habitat values of the existing creek as feasible. Unfortunately, at times homes are constructed too close to creeks that eventually have to be enlarged. Such creek enlargements usually require some sacrifice to the streams riparian habitat. All cities in the County are consistently advised as to setback requirements for new development. This advice was not always heeded in the past.

Jim Stallman

Comment 1: $8,000,000 is too much to spend on the Lawrence Expressway to Miller Avenue reach. Flooding only affects a few streets and then only after 2 weeks of solid rainfall. I don't know that voters realize how the money is spent.

Response 1: In the past, Calabazas Creek, like most other major streams in Santa Clara County, has experienced severe flooding which in turn has forced the evacuation of many businesses and residents. During the 100-year flood event, over 2,000 homes would be flooded and damages would exceed $35 million. This potential for flood damage makes Calabazas Creek a high priority problem in the District's North Central Flood Control Zone.

Since the June 1990 voter approval of additional flood control benefit assessments in the North Central Zone, the construction schedule has been accelerated to reduce the construction period from 12 to 6 years.

Comment 2: I maintain that enlarging the culverts and sensible use of the remaining orchard lands at this location is the only justified strategy. The District's funds should be directed more towards maintenance instead of Army Corps of Engineers type solutions. I am concerned that a system that has the beneficiary develop the project plans ensures that just certain options will be considered.

Response 2: We investigated many alternatives. Several, such as upstream storage, off-stream storage, or nonstructural alternatives were technically or economically infeasible. The cost to purchase vacant orchard lands for off-stream storage alternatives is overwhelmingly expensive considering the amount of land that would be required. However, five alternatives, for Reaches 1-8, were feasible and ranged in cost from $8.3 to 10.3 million. They are summarized in Table 6 of the Engineer's Report. A more detailed discussion on the evaluation of various alternatives is contained in the section entitled "Alternatives Feasibility and Their Significant Impacts." The proposed project will preserve and protect nearly 50 percent of the trees along the creek. Those that must be removed will be mitigated with an extensive revegetation program to reestablish the aesthetic and habitat values of the existing creek. Unfortunately, at times homes are constructed too close to creeks that eventually have to be enlarged. Such creek enlargements usually require some sacrifice to the streams riparian habitat. All cities in the County are consistently advised as to setback requirements for new development. This advice was not always heeded in the past.

Comment 3: It is surprising to learn that the District has not kept informed on changes to the creek drainage demands represented by Route 85 work planned for Cupertino nor the possible conversion of orchard land use adjacent to the project.

Response 3: We have been working closely with the County Traffic Authority to ensure that the Highway 85 improvements do not negatively impact downstream reaches of Calabazas Creek or its floodplain. Our planning process also includes extensive interaction with the cities, regulatory agencies, environmental groups, and local residents as well as specialists in a variety of areas when specific expertise is required. We do this to ensure that the project which is finally proposed has the least environmental impact and greatest public acceptance. We also have ongoing communication with all cities and the County with regard to floodplain management measures, the national flood insurance program, and alternative streamside development.

Judy Mohr-Stephens

Comment 1: I request that trees and shrubs very close to fences that do not affect the project itself, be allowed to remain.

Response 1: Trees and shrubs near the edge and outside of the construction envelope can probably be spared. Depending on the existing bank configuration (whether a cut or a fill is proposed) some root damage may occur. Trees which are to remain are identified on the plans in the Engineer's Report. See response to General Comment No. 2.

Petitions from Residents near Reach 2

Petition 1:	I support the 29A option of the Calabazas Creek General Plan so as to preserve as many trees as possible including the oak trees along the downstream portion of the reach between Homestead and Lochinvar. I also request maximum mitigation.
Petition 1A:	I support the 29A option of the Calabazas Creek General Plan so as to preserve the oak trees along the downstream portion of the reach between Homestead and Lochinvar. I also request that as many other trees be preserved as possible and that the mitigation be maximized.

The written letter of response to Petitions 1 and 1A, as sent to petitioners, is included in this Appendix. Also see response to General Comment No. 2.

ORAL COMMENTS

Mr. Jon Boyes

Comments:	Mr. Boyes introduced himself as representing the Tandem Computer Company and paraphrased the company's comment letter.
Response:	See response to specific written comments.

Mr. Bob Mortenson

Comment 1:	Mr. Mortenson introduced himself as representing the City of Santa Clara and paraphrased the city's comment letter.
Response 1:	See responses to specific written comments.
Comment 2:	Has the District investigated the Baylands Flood Basin alternative as a multipurpose facility to collect and treat polluted urban runoff addressing the goals of the "Santa Clara Valley Nonpoint Source Control Program?"
Response 2:	The District has investigated the multipurpose opportunities associated with the various project alternatives. The Baylands Flood Basin Alternative was reviewed by the District's Nonpoint Source Control Program coordinator, where its potential was categorized in the "Community Specific Stormwater Management Program." Since this program is currently in the development stage, no specific consideration as to the feasibility of this multipurpose approach is available at this time. The dismissal of this alternative to solve the flood problems on Calabazas Creek does not preclude any future multipurpose opportunities

such a basin may have for the nonpoint source program or other flood control issues.

Mr. Travis Witten

Comment 1: Mr. Witten introduced himself representing the City of Cupertino and paraphrased the city's comment letter.

Response 1: See responses to specific written comments.

Mr. Jim Stallman

Comment 1: Mr. Stallman paraphrased his comment letter.

Response 1: See responses to specific written comments.

Mr. Wagner

Comment 1: Has the District considered the future upstream changes to the watershed which might affect this project?

Response 2: The District planning criteria consider all of the cities' and county future growth plans for the watershed in establishing design requirements.

Ms. Chris Smith

Comment 1: What assurance is there that the proposed bypass channel in Reach 1B will be constructed, considering the development plan for the property that she saw does not include it.

Response 1: The District and the City of Santa Clara coordinate land development proposals to insure the land necessary for flood control improvements is provided. The City of Santa Clara, through its land development approval process, has conditioned the development to provide the rights of way necessary for the flood control project. The developers of this property have met with the District staff and have incorporated the rights of way for the flood control project into their plans. As of February 1992, arrangements for acquisition by the District are in process.

Mr. Paul Stevens

Comment 1: Why is this process taking so long?

Response 2: The planning process for Calabazas Creek has taken more time than anticipated because of recent changes in flood control standards of protection which are established by the Federal Emergency Management Agency. The revision of these standards occurred late in the planning process, when the original project limits began at Lawrence Expressway and extended upstream to Miller Avenue. As a consequence of the standard change, downstream portions of previously improved channel were no longer considered adequate to convey the 1 percent flood and the project study limits were extended to include all of the downstream channels to San Francisco Bay. This extension added 5.5 miles to the original 2.1 mile study reach requiring additional time to resolve the channel adequacy issue.

Mr. Tom Wilson

Comments: Mr. Wilson paraphrased his comment letter.

Responses: See responses to specific written comments.

Ms. Amy Erickson

Comment 1: The District should be primarily concerned about flood control and not environmental concerns.

Response 1: The District's flood damage reduction program's primary goal is to efficiently minimize flood damage in a lawful manner consistent with community goals. It is the District's experience that the most effective process to attain this goal is to identify and address the environmental consequences of installing flood control infrastructure and mitigate them in a reasonable and expeditious manner.

WRITTEN COMMENTS ON CORPS OF ENGINEERS PUBLIC NOTICE

National Marine Fisheries Service

Comment 1: Although this stream does not currently support steelhead, it is a potentially restorable stream. This project could significantly reduce that potential.

Response 1: The project will not decrease the potential for restoration. There will be no increased velocities or other barriers to passage. Turbidity will decrease and shading will increase.

Comment 2: Wetlands in and around the San Francisco Bay contribute to the health of the Bay and the marine environment and their losses need to be minimized and fully mitigated. It is the policy of the National Marine Fisheries Service to recommend denial of permits that result in a net loss of wetlands habitat. The applicant should also look at ways of reducing impacts by avoidance such as moving maintenance roads.

Response 2: In response to similar comments, from other agencies, the project has been modified to eliminate in-channel maintenance roads where not essential. New wetland areas will be created to offset unavoidable losses. A formal wetland determination was conducted to establish exact impact, impact reduction, and mitigation areas. The modifications have minimized impacts from 5 acres to 1.7 acres. New wetland areas totaling 1.7 acres will be created by removing portions of existing levees.

Comment 3: The applicant discussed a "conceptual" mitigation plan in the public notice. The applicant should develop a comprehensive mitigation plan that will fully offset any loss of habitat.

Response 3: The conceptual mitigation plan is comprehensive and includes monitoring. The mitigation plan, which is presented in the report, provides for planting approximately 4,500 native trees and shrubs and creation of 1.7 acres of brackish marsh. The report also lists the number of plantings per reach, target planting densities, plant species, and approximate species proportions. Revegetation areas are identified in the mitigation plan. Detailed plans and specifications for revegetation projects are prepared after channel modifications are complete.

The report also identifies the California Department of Fish and Game and the Army Corps of Engineers as reviewing agencies for revegetation plans and specifications and the CDFG as one of the reviewing agencies for postconstruction monitoring.

Fish & Wildlife Service

Comment 1: The Service is concerned about the continued and cumulative impacts to wetlands within the San Francisco Bay area. Our mitigation goal for unavoidable impacts is that there be no net loss or loss of in-kind habitat value or acres. The proposed project would lead to significant adverse impact to fish and wildlife and their habitats.

Response 1: The proposed project has been modified to reduce impact to wetlands in the tidal reaches where avoidable. New tidal wetland area will be created to mitigate for unavoidable impacts. The project has been designed to require minimal in-channel maintenance or substantially less than is currently required. In the tidal reaches, there will be no net loss of habitat acreage and an improvement in habitat value. In the upland reaches, a bypass channel is proposed to avoid impacts to a natural section of channel. A HEP analysis indicated the project would result in a long-term benefit in upland reaches. The overall impact of the revised project will be an enhancement to fish and wildlife habitat.

Comment 2: Although the applicant is offering mitigation, it is only conceptual at this stage making it difficult to evaluate its effectiveness in compensating for unavoidable resource losses. Furthermore, given limited success of the mitigation for the Llagas Creek flood control project, the probability of success of mitigation for this project is not high.

Response 2: The proposed project has been designed to avoid environmental impacts where possible. The proposed mitigation plan which is presented in the report provides for planting approximately 4,500 native trees and shrubs in Reaches 1-8 and 1.7 acres of brackish marsh in Reach 9. The report also lists the number of plantings per reach, target planting densities, plant species, and approximate species proportions. Revegetation areas are identified in the report.

The report also identifies the California Department of Fish and Game and the Army Corps of Engineers as reviewing agencies for the mitigation plans and specifications and the CDFG as one of the reviewing agencies for postconstruction monitoring.

The District has revegetated gabion channel lining projects on two reaches of Saratoga Creek and on one reach of Guadalupe River. These succeeding revegetation projects are the basis for our revegetation plans on the reaches of Calabazas Creek where gabion lining is proposed. The Llagas Creek revegetation project was designed and installed by the Soil Conservation Service not the District.

Comment 3: Because we received the report 1 week prior to preparing these comments, we were unable to do an in-depth review. Therefore, we are unable to determine if the proposed project is the least damaging alternative.

Response 3: Numerous alternative solutions to the flooding, erosion, and sedimentation problems have been investigated. Alternatives investigated include upstream reservoirs, floodplain acquisition, various types of channel modification, bypass channels and flood basins. The proposed project provides 1 percent flood protection while minimizing construction and maintenance cost and overall impact to the community and natural environment. A detailed evaluation of alternatives is presented in the report.

The proposed plan has evolved over several years and has been modified to avoid or reduce impacts where practical. As a result of comments received at a May 1986 public meeting, the plan for Reaches 1-8 was modified to include more expensive stepped gabions where tree removal could be avoided. Tree loss was reduced from 95 percent to 49 percent. The plan for Reaches 1-8 was presented to a Section 404 interagency committee in March 1987. Resulting modifications included a bypass channel to avoid impacting a natural section of channel and a widened channel section to provide additional in-stream vegetation. More recently, as a result of comments received on the Draft EIR from the CDFG, the project was modified in Reaches 9-12 by eliminating in-channel maintenance roads where possible and by providing for creation of new wetland.

California Archeological Inventory

Comment 1: The proposed project area contains, or is adjacent to, the archeological resources CA-SCL-134, C-169, C-915. A study is recommended.

Response 1: Cultural resource evaluations were conducted during the project planning process and are included in as Appendices Q and R of the report. These investigations revealed two possible significant sites adjacent to the project area. Excavation near these areas will be monitored by a qualified archeologist.

Environmental Protection Agency

Comment 1: EPA cannot support projects that have the potential to result in adverse impacts to the aquatic ecosystem in the absence of an analysis of the availability of less environmentally-damaging alternatives. The 404(b)(1) Guidelines require that the selected alternative be the least damaging practicable alternative to achieve the project purpose [40 CFR 230.10(a)]. We are unable to determine whether potential project impacts to the aquatic environment can be practicably reduced or avoided by employing alternative methods of bank stabilization and/or relocating, redesigning, or down-scaling either all or portions of the proposed project.

Response 1: Numerous alternative solutions to the flooding, erosion, and sedimentation problems have been investigated. Alternatives investigated include upstream reservoirs, floodplain acquisition, various types of channel modification, bypass channels, and flood basins. The proposed project provides 1 percent flood protection while minimizing construction and maintenance cost and overall impact to the community and natural environment. A detailed evaluation of alternatives is presented in the report.

The proposed plan has evolved over several years and has been modified to avoid or reduce impacts where practical. As a result of comments received at a May 1986 public meeting, the plan for Reaches 1-8 was modified to include more expensive stepped gabions where tree removal could be avoided. Tree loss was reduced from 95 percent to 49 percent. The plan for Reaches 1-8 was presented to an interagency committee in March 1987. Resulting modifications included a bypass channel to avoid impacting a natural section of channel and a widened channel section to provide additional in-stream vegetation. More recently, as a result of comments received on the Draft EIR from the CDFG, the project was modified in Reaches 9-12 by eliminating in-channel maintenance roads where possible and by providing for creation of new wetland.

Comment 2: EPA is concerned with the cumulative effects of the past proposed project on the aquatic ecosystem when considered with past flood control activities in South Bay streams. The subject public notice contains no information on the magnitude of potential project-related impacts to downstream hydrology and water quality. The Guidelines prohibit the discharge of dredged or fill material if it will cause or contribute to significant degradation of the waters of the United States [40 CFR 230.10(c)].

Response 2: The proposed project has been modified to reduce impact to wetlands in the tidal reaches where avoidable. New tidal wetland area will be created to mitigate for unavoidable impacts. The project has been designed to require minimal in-channel maintenance or substantially less than is currently required. In the tidal reaches, there will be no net loss of habitat acreage and an improvement in habitat value. In the upland reaches, a bypass channel is proposed to avoid impacts to a natural section of channel. A HEP analysis indicated the project would result in a long-term benefit in upland reaches. The overall impact of the revised project will be an enhancement to fish and wildlife habitat.

The project will not result in contamination or have any detrimental effect on existing water quality or quantities of either surface water or subsurface water. Less frequent channel maintenance and bank stabilization will result in decreased turbidity.

Comment 3: We are not aware of any site specific mitigation measures or plans to offset unavoidable project-related impacts to the aquatic environment. The Guidelines require a finding of noncompliance if the proposed discharge does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem [40 CFR 230.10(a)(3)(iii)].

Response 3: The proposed mitigation plan is comprehensive and includes monitoring. The proposed mitigation plan, which is presented in the report, provides for planting approximately 4,500 native trees and shrubs and creation of 1.7 acres of brackish marsh. The report also lists the number of plantings per reach, target planting densities, plant species, and approximate species proportions. Revegetation areas are identified in the report.

The report also identifies the California Department of Fish and Game and the Army Corps of Engineers as reviewing agencies for revegetation plans and specifications and the CDFG as one of the reviewing agencies for postconstruction monitoring.

Comment 4:

The lack of quantification of individual and cumulative impacts is also a serious deficiency. The 404(b)(1) Guidelines [40 CFR 230.12(a)(3)(iv)] prohibit the discharge of dredged or fill material if there does not exist sufficient information to make a reasonable judgment as to whether the proposed discharge will comply with the Guidelines.

Response 4:

As described in the report, numerous impact analyses were conducted within the study area to quantify and qualify project impacts. Studies were conducted to identify and quantify impacts to vegetation, wildlife and fisheries. A HEP analysis was performed. A wetlands determination has also been recently conducted. During its development, the project plan was modified several times to avoid impacts where possible. Mitigation has been identified to offset unavoidable impacts.

LETTER OF

RESPONSE TO PETITION FROM

RESIDENTS NEAR REACH 2

Santa Clara Valley Water District
5750 ALMADEN EXPRESSWAY
SAN JOSE, CALIFORNIA 95118
TELEPHONE (408) 265-2600
FACSIMILE (408) 266-0271
AN AFFIRMATIVE ACTION EMPLOYER

May 3, 1990

Dear Resident,

This letter is in response to a petition you signed in November of 1989 regarding the proposed flood control project on Calabazas Creek between Lochinvar Avenue and Homestead Road. The petition was in support of an alternative to the design proposed by the District for this part of Calabazas Creek. Having considered the matter in more detail, District staff finds that it cannot recommend revising its original design proposal.

At issue is the fate of six of the eleven existing large oak trees. The District's original design proposal includes a revegetated, trapezoidal, gabion-lined channel centered within the right-of-way. All of the eleven large oak trees would need to be removed under that proposal, which was described in the Engineer's Report.

District staff developed the alternative design supported in the petition with the objective of finding a plan that would save as many of the existing oak trees as possible. Most of the oak trees are on the bank near the middle of the right-of-way. Avoiding the trees required squeezing a channel into less than half of the right-of-way between the trees and the backyard fences on the east side of the creek. A vertical-walled concrete channel was the only design that would safely carry the 100-year flood and fit into that confined space. Six of the eleven large oak trees would be saved.

After considerable study, however, it is the opinion of District staff that the alternative design is inferior to the originally proposed design. This is because the channel banks could not be replanted, the stream would no longer recharge the groundwater basin because of the concrete sides and bottom, and the 12 foot vertical concrete wall would eliminate creek access for the properties on the east bank. Drawings showing both the alternative design and the proposed design are attached. Advantages and disadvantages of both designs are listed below the drawings.

The residents who circulated the petition were informed that staff would recommend the alternative design only if it could be shown to have broad support among those who live adjacent to the creek. They were also informed that any petition must be clearly written, indicating that those who signed it had a clear understanding of the proposal and the issues.

Of twenty-one properties adjacent to the creek, fifteen were represented on the petition. The language in the petition raised doubts of whether there was clear understanding of the proposal by those who signed. After speaking with some of the residents who signed the petition, we believe neither the alternative nor its comparison with the originally proposed design had been clearly explained to them. When informed further about the two plans by District staff, their expressed preference was the originally proposed project.

We understand the desire of residents along the creek to preserve these valuable trees. It does not appear that there is a feasible way to save the trees, provide protection from the 100-year flood, be equitable to residents along both sides of the creek, and provide for a future high quality habitat. We believe that the originally proposed design, even with the loss of the trees, strikes the best balance among these conflicting concerns and therefore is the best design for this section of Calabazas Creek.

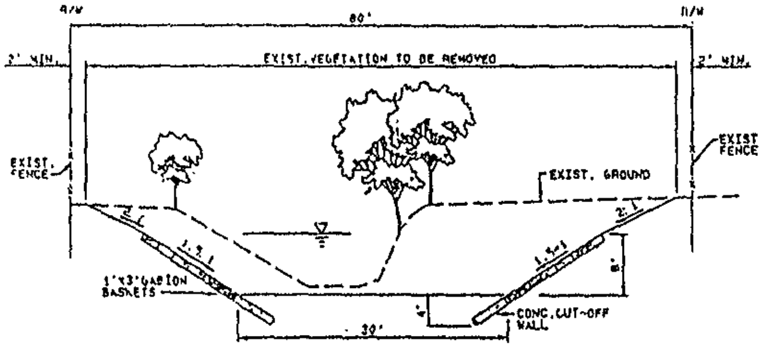
Thank you for your interest in this project and for expressing your views. Please do not hesitate to contact me or Mr. Randy Talley at (408) 927-0710, should you have questions.

Sincerely,

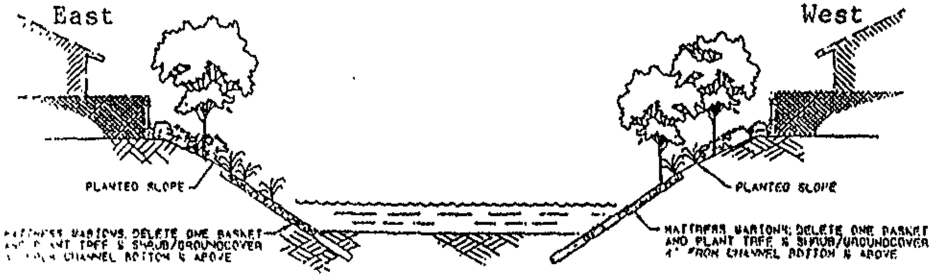
Stan N. Wolfe
Head, Project Development Branch
Flood Control

Attachment

PROPOSED PLAN



TYPICAL SECTION
NTS


East
West
PLANTED SLOPE
PLANTED SLOPE
MATTRESS VARIONS, DELETE ONE BASKET AND PLANT TREE & SHRUB/GROUNDCOVER 4' FROM CHANNEL BOTTOM & ABOVE
MATTRESS VARIONS; DELETE ONE BASKET AND PLANT TREE & SHRUB/GROUNDCOVER 4' FROM CHANNEL BOTTOM & ABOVE

TYPICAL SECTION
10 - 15 YEARS MATURITY

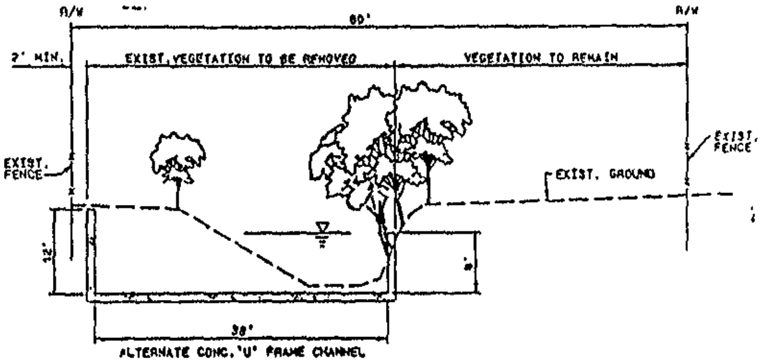
Advantages

- Instream vegetation and revegetation
- Lower construction cost
- Equitable to property owners on both sides
- Maintain groundwater recharge
- No fencing required

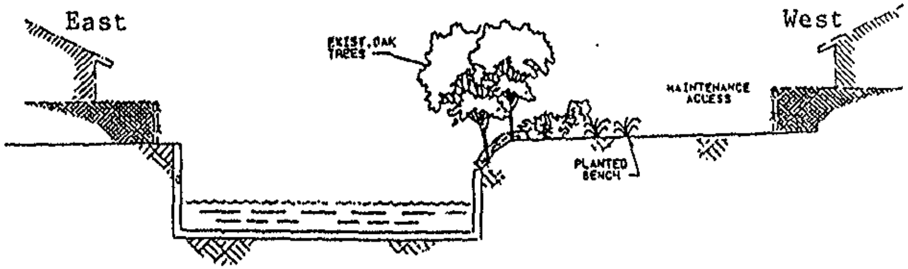
Disadvantages

- Loss of eleven large oaks
- Higher maintenance cost

ALTERNATIVE PLAN (PETITION)



TYPICAL SECTION
NTS



TYPICAL SECTION
10 - 15 YEARS MATURITY

Advantages

- Save six of eleven large oaks
- Low maintenance cost

Disadvantages

- Higher construction cost ($150,000)
- Loss of groundwater recharge
- No provision for instream vegetation
- Not equitable to property owners on both sides
- Fencing required at top of vertical wall

LETTERS OF COMMENT

STATE OF CALIFORNIA—OFFICE OF THE GOVERNOR GEORGE DEUKMEJIAN, *Governor*

OFFICE OF PLANNING AND RESEARCH
1400 TENTH STREET
SACRAMENTO, CA 95814

November 9, 1989

Dr. Bernie Goldner
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

11/13 BHG
RRE
JAM
RRS
RRT
SNW

1319 '89 NOV 13 AM 1:46

Subject: Calababas Creek Flood Control Project
SCH# 89092602

Dear Dr. Goldner:

The State Clearinghouse submitted the above named environmental document to selected state agencies for review. The review period is closed and none of the state agencies have comments. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.

Please call Loreen McMahon or Nancy Mitchell at (916) 445-0613 if you have any questions regarding the environmental review process. When contacting the Clearinghouse in this matter, please use the eight-digit State Clearinghouse number so that we may respond promptly.

Sincerely,

David C. Nunenkamp
Deputy Director, Permit Assistance

STATE OF CALIFORNIA—THE RESOURCES AGENCY GEORGE DEUKMEJIAN, Gove

DEPARTMENT OF FISH AND GAME
POST OFFICE BOX 47
YOUNTVILLE, CALIFORNIA 94599
(707) 944-5500

11/22 BHG
SMW
RRE
[illegible]
[illegible]
JAM

November 20, 1989

Dr. Bernie Goldner
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

3718 '89 NOV 22 P1:20

Dear Dr. Goldner:

Draft Environmental Impact Report (DEIR)
Calabazas Creek Flood Control Project

Department of Fish and Game personnel have reviewed the DEIR for the proposed flood control project on Calabazas Creek. The project would widen the existing stream channel and/or raise levee banks from Guadalupe Slough upstream to Miller Avenue.

Widening the existing Calabazas Creek channel within limited, right-of-way would achieve one percent flood protection and preclude existing flood hazards. The proposed project incorporates extensive revegetation within reaches 1 through 8 to offset project related losses of stream associated vegetation. A Habitat Evaluation Procedure (HEP) for the project in these areas indicates that no loss of habitat value would occur over the life of the project with the proposed revegetation and maintenance practices.

It is the Department's policy that projects should result in no net loss of either wetland acreage or habitat value. Review of the proposed project indicates that the project will result in the permanent loss of approximately 3.0 acres of emergent wetlands in reaches 9, 10, and 11. This loss would be incurred by the placement of fill for depressed maintenance roads on both sides of the channel. The proposal to provide habitat areas requiring infrequent maintenance, while desirable, does not offset the impacts resulting from permanent loss of wetland areas. We recommend that the channel treatment in these reaches be modified to remove one or both of the depressed maintenance roads. If this is not feasible, new wetland acreage should be created.

Other mitigation measures recommended for reaches 9 through 12, are appropriate with the following modifications and should be incorporated as project requirements.

1. No vegetation clearing for construction or maintenance should occur between March 1 and July 31 to avoid impacts to breeding birds.

2. Surveys for burrowing owls should be conducted prior to reconstructing levees. If owls are found during the breeding season, work should be delayed until after the young have fledged. At other times, a plan for their relocation should be developed and implemented in consultation with the Department.

3. In Reach 12, a proposed habitat area is indicated at the toe of the eastern levee. The Department recommends that no maintenance beyond the hand removal of downed trees and collected debris be permitted.

Review of impacts to reaches 1 through 8, indicates that 49 percent (162) of the existing streamside trees will be removed. The District proposes to compensate for these losses by planting 3,000 trees and shrubs totalling eight acres on the upper banks and bank tops in these reaches. As noted previously, the Department concurs with the results of the HEP which indicate that post project habitat values will be equal to or greater than existing conditions. We recommend that the following mitigation measures be included as project requirements.

1. Detailed revegetation plans be prepared prior to project construction and submitted to the Department for review and approval.

2. Monitoring of revegetated areas be conducted for five years after initial planting. Annual monitoring reports should be submitted to the Department documenting survival and condition of planted materials.

3. The District test the feasibility of salvaging and replanting trees which would be removed during construction.

Project implementation will require a streambed alteration agreement with the Department, as provided in Section 1601 of the Fish and Game Code. Since it is expected that project implementation will occur over 10 to 12 years, we recommend that a Memorandum of Understanding (MOU) be entered into between the Department and Water District based upon the certified EIR. The MOU would form the basis for project-specific streambed alteration agreements for each reach as it is constructed. Once the project is constructed, the existing channel maintenance MOU between the Santa Clara Valley Water District and the Department should be modified to reflect any changes.

If you have any questions concerning our comments, they should be directed to Carl Wilcox, Associate Wildlife Biologist, at (707) 944-5515.
5515

Sincerely,

Brian Hunter

Brian Hunter
Regional Manager
Region 3

cc: Ms. Cay Goude
U. S. Fish and Wildlife Service

Corps of Engineers, Regulatory Branch

Mr. Phil Oshida
Environmental Protection Agency

City of Cupertino

10300 Torre Avenue
Cupertino, California 95014
Telephone: (408) 252-4505

PUBLIC WORKS DEPARTMENT

P.O. Box 580
Cupertino, California 95015

11/2 RET
SNW

October 30, 1989

Mr. Randall R. Talley
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

9597 '89 NOV -2 P1:50

Re: Calabazas Creek

Gentlemen:

We have reviewed the Calabazas Creek Planning Study dated September 1989 and we have no major comments regarding the report itself.

As you are aware the lack of these improvements causes frequent flooding of major arterials and private property in the city. It is imperative that these improvements be completed as soon as possible and the city will give its full support to a bond issue or other means of financing to accelerate this work.

The preliminary drainage report from the Traffic Authority for Route 85 indicates there may be additional impact to this reach of Calabazas Creek. We urge you to extend this project southerly to Route 85.

Very truly yours,

CITY OF CUPERTINO

Bert. J. Viskovich
Director of Public Works

TW/slj

THE CITY OF SANTA CLARA
CALIFORNIA

OFFICE OF THE
MAYOR

CITY HALL
1500 WARBURTON AVE.
SANTA CLARA, CA. 95050
(408) 984-3250

October 27, 1989

11/13 BHG
13 RRE '89 NOV 13 P12:59
JAM
RRS
RRT
SNN

Dr. Bernie Goldner
Environmental Specialist
Project Development Branch
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Reference: Calabazas Creek, Guadalupe Slough to Miller Avenue

Dear Dr. Goldner:

We have reviewed the Santa Clara Valley Water District's Engineer's Report and Environmental Impact Report for the proposed flood control project on Calabazas Creek, from the Guadalupe Slough upstream to Miller Avenue. Having witnessed the overbanking of the Calabazas Creek in the upper reaches of our City and the near overbanking between Highway 237 and Highway 101 during the February 1986 storm, we know this flood control project is urgently needed. Had overbanking occurred between Highway 237 and Highway 101, the flooding would have been catastrophic since the escaping flood waters would have been dammed by the roadway embankment of Highway 237 and creek banks of the San Tomas Aquino Channel and Calabazas Creek.

The City of Santa Clara realizes the importance of this urgently needed project and fully supports it. We further urge the Water District to proceed with the project at the earliest possible date, particularly for the reach between Guadalupe Slough and Highway 101. Towards this end, the City would support the extension of the benefit assessment district at an earlier date than 1991 and the use of bonds or other methods to accelerate construction of this project.

The City of Santa Clara is also concerned that the District's flood control projects be constructed in the most economic manner consistent with appropriate environmental protection. In this regard, some of the Council expressed their concern regarding the need and added expense to accommodate both a natural channel and a gabion-lined channel in the Reach 1 area between Lawrence Expressway and Lochinvar Avenue. Having a short isolated reach of natural channel so far upstream is inconsistent and out of character with the planning and improvement for Calabazas Creek. Only this short reach in the 7.6 miles of channel improvement would have this natural channel.

Very truly yours,

Eddie Souza

Everett N. Souza
Mayor

Jennifer Sparacino

Jennifer Sparacino
City Manager

JS:ES:SY:hb

cc: Assistant City Attorney
Director of Public Works

CLBZSCRK.PLN
AG

CITY OF SUNNYVALE
CALIFORNIA

Telephone (408) 730-7429

October 25, 1989

10/27 RRS
BHG
SNW

RECEIVED
OCT 27 1989

Mr. Robert Smith
Flood Control Manager
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, California 95125

Subject: Calabazas Creek Planning Study;
Engineer's Report and Draft EIR

Dear Mr. Smith:

Thank you for the opportunity to review and comment on the subject report. The concerns of the staff regarding the reaches in the City of Sunnyvale appear to have been documented and we look forward to the successful implementation and construction of the project.

Very truly yours,

Marvin A. Rose
Interim Director of Public Works

E. M. Yoshizuka
Senior Civil Engineer

EMY:vm

cc: Marvin Rose
Bill Weisend
Dan Burke

ADDRESS ALL MAIL TO: P.O. BOX 3707 SUNNYVALE, CALIFORNIA 94086-3707
For deaf access, call TDD/TTY (408) 730-7501

TANDEMCOMPUTERS

Ultra Express
10/25
RRT
SNW
RRS
BHG
RRE
JAM

October 23, 1989

Mr. Randy Talley
Flood Control Planning Division Engineer
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Re: Calabazas Creek Flood Control Project

'89 OCT 25 PM2:59

7827

Dear Mr. Talley:

Tandem Computers is very interested in the proposed mitigation plan to control flooding along Calabazas Creek. We own and/or occupy six sites, between Homestead Road in Santa Clara and Vallco Parkway in Cupertino, which border on the Creek and are periodically flooded. The potential for business interuption and property damage is of extraordinary concern. Even without flooding, the perpetual erosion of the banks and the unsightly character of the waterway fosters continued loss of real estate and a true eyesore for our employees and the community. We are anxious to convey support for the Project and to urge the District to accelerate the construction schedule.

Of immediate interest to us is Reach #5, between I-280 and North Tantau Avenue, in Cupertino. The channel in this area is at the heart of a campus core improvement project which fronts on three of the six aforementioned sites. We would like to encourage the use of the stepped gabions as they provide a much more visually appealing profile as well as affording more opportunities to retain and enhance the character of the vegetation in the channel. We would also like to suggest an alternate access ramp location, adjacent to I-280 rather than at the Tantau culvert, so as to present a less utilitarian view from the public street. We would, of course, provide whatever easements would be required to access the ramp in the revised location.

We will be represented at the meeting on Wednesday evening and look forward to the opportunity of reinforcing our concerns and also our willingness to work with the District to accelerate the achievement of our mutual goals.

Sincerely,

Jon Boyes
Site Development Manager
Corporate Real Estate and Construction

cc: Mr. Robert Cowan, City of Cupertino
Mr. Bert Viskovich, City of Cupertino
Mr. Dave Von Rueden, CH2M HILL

Tandem Computers Incorporated
10600 Ridgeview Court
Cupertino, CA 95014

1121 Lorne Way
Sunnyvale, Cal. 94087

7 November, 1989

Dr. Bernie Goldner
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, Cal. 95118

Dear Dr. Goldner,

I hereby endorse and support the features of the proposed flood control project for Calabazas Creek which significantly contribute to a decreased risk of flooding. I feel that the predominant work that is needed to reduce this risk consists of: 1. increasing the flow capacity of street crossing culverts 2. widening significant neckdowns within the creek 3. securing and protecting trees which are at risk from high flow rates. I also acknowledge and support the need for erosion control for which I feel engineered riprap has been demonstrated to be adequately effective at a fraction of the proposed financial and environmental cost.

I and most of my neighbors have serious concerns, however, about the environmental impact of the extensive channelization portion of the project as has been expressed numerous times throughout the planning phase. I do respect and support the level of proposed mitigation in comparison to older projects. The best mitigation, however, is the non-removal of existing vegetation.

We are becoming increasingly aware of the environmental atrocities being committed around our planet such as the burning of rain forests which have a global effect on us all. But the problems are not just with "them". We have a collective impact and individual responsibility within our own valley. Every species and tree counts. The obsession that we have for the total elimination of all risks (at any cost), such as some infrequent flooding and optimum erosion and maintenance control, must be constantly weighed against other significant short and long term losses and risks such as the deteriation of our environment and resultant quality of life.

If the District, however, feels that a significant reduction in the scale and impact of the channelization is not acceptable, I strongly request the following minimum modifications and amendments to the Planning Study:

1. A review of the entire project to preserve as many additional trees and plants as possible and to so identify on the plans.

2. The preservation of the oak trees on the westerly side of the reach between Lochinvar and Homestead per plan 29A as endorsed by the enclosed signatures.

3. The preservation of the three Liquidambars and Pittosporum as well as the identified Birch along my property (adjacent to Stepovich) within the above reach.

4. An Easterly shift in the channel and a minimum of ten feet of level bank (from the fence) along my property so as to provide additional protection for the plants identified in item 2. above.

5. An Easterly shift in the channel along the Stepovich property so as to preserve as much of the existing vegetation as possible.

6. Intensive monitoring of the project contractors to insure the protection of a maximum of vegetation and all identified plants on the plans.

7. A comprehensive plan to monitor and insure the implementation, rapid growth, and long term success of the planned mitigation.

I also request further study of more significant techniques to minimize the environmental impact to Calabazas Creek and other planned projects within the valley such as has been successfully implemented in other districts. I understand that some of these possibilities include impulse reservoirs, check dams, and bypasses. For example there is a unique opportunity to utilize the Marchese property upstream from Homestead Rd. such as for another bypass similar to the one planned upstream from Lawrence Expressway. Further implementation of advanced water control techniques I feel would complement the District's leadership position with mitigation and would contribute significantly to our community.

Thank you for your continued considerations of my suggestions and requests of the community. I anxiously await your positive responses. I would be pleased to meet with you for further discussions.

Respectfully,

Tom Wilson

Thomas K. Wilson

I support the 29A option of the Calabazas Creek General Plan so as to preserve the oak trees along the downstream portion of the reach between Homestead and Lochinvar. I also request that as many other trees be preserved as possible and that the mitagation be maximized.

Date	Name	Address	Petition Recvd.
4 Nov 89	Thomas K. Wilson	1121 Lorne Way Sunnyvale	✓
	Thomas K. Wilson		
4 Nov 89	Louise S. Wilson	1121 Lorne Way Sunnyvale	✓
	Louise S. Wilson		
7 Nov 89	Rachael Hayes	1614 Benton Ct	✓
7 Nov	NAN LYON Nan Lyon	1626 Benton Ct	✓
Nov. 7 89	Elizabeth A Batson	1632 Benton Court	✓
7 Nov 89	James Batson	1632 Benton Ct	✓
7 Nov 89	R E Wagner	1638 Benton Ct	✓
7 NOV 89	Brad Bunn	1644 Benton Ct	✓
Nov 7-89	G Botenhagen	1645 Benton Ct	✓
11/7/89	Lois C Botenhagen	1645 Benton Ct.	✓
11/7/89	William J. Ferguson	1117 Lorne Way	✓
11/7/89	William P. Ferguson	1117 LORNE WAY	✓
11/7/89	Daniel L. Ferguson	1117 LORNE WAY	✓

I support the 29A option of the Calabazas Creek General Plan so as to preserve as many trees as possible including the oak trees along the downstream portion of the reach between Homestead and Lochinvar. I also request maximum mitagation.

Date	Name	Address	Petition Recvd.
11-1-89	Ray Jones	1677 VIREO AVE Svale	✓
11-1-89	[illegible] Jones	1677 Vireo ave Svale	✓
11-1-89	Valerie Ruiz	1661 Vireo Ave Svale	✓
11-1-89	Earl Guest	1683 Vireo Ave S'vale	✓
11-1-89	Tracy Herm	1645 Vireo Ave S'vale	✓
11-1-89	Judy Miller Stephens	1114 Lorne Way, Synvale	✓
11-1-89	Josephine Lopez	1629 Vireo Ave	✓
	William Lopez	1629 VIREO AVES	✓
11-1-89	[illegible]	1621 Vireo AVE	✓
11-1-89	Bill Hoff	1621 VIREO AVE	✓
11-1-89	Joyce Hoff	1621 Vireo ave	✓
11-1-89	[illegible] Bracht	1605 Vireo Ave	✓
11-1-89	Paul Stephens	1119 LORNE WAY	✓
11-1-89	Bob Huddleston	1665 VIREO AVE	✓

11/13 JAM n/a
RRT ..
SNW ..
RRS ..
BHG "
KPE "

1119 Lorne Way
Sunnyvale, CA 94087
November 5, 1989
(408)984-5993 home
(408)241-8422 message

Santa Clara Valley Water District
Jeff Micko
5750 Almaden Expressway
San Jose, CA 95118

Dear Jeff:

Enclosed is my list of people who are interested in supporting option 29A for the Calabazas Creek General Plan to preserve the oak trees.

I am also requesting that other trees and shrubs very close to people's fences that do not affect the project itself, be spared the axe. These trees are important to us. They are feeding grounds for many song birds during the day. There are only a few simple things in life that we would like to rescue from the progress of modern civilization — a bird's song is one of them. ***Thank you for your decision ahead of time on saving these trees and shrubs.***

Sincerely,

Judy,

Judy Mohr-Stephens

Enclosure: one (1)

RECEIV
NOV 13 1989

I support the 29A option of the Calabazas Creek General Plan so as to preserve as many trees as possible including the oak trees along the downstream portion of the reach between Homestead and Lochinvar. I also request maximum mitagation.

Date	Name	Address	Petition Recvd.
11-1-89	Ray Jones	1677 Vireo Ave Svale	✓
11-1-89	Keran Jones	1677 Vireo ave Svale	✓
11-1-89	Valerie Ruis	1661 Vireo Ave Svale	✓
11-1-89	Earl Guest	1653 Vireo Ave S'vale	✓
11-1-89	Tracy Hern	1645 Vireo Ave S'vale	✓
11-1-89	Judy Mylo Stephens	1119 Lorne Way, Svale	✓
11-1-89	Josephine Lopez	1629 Vireo Ave	✓
	William Lopez	1629 Vireo Aves	✓
11-1-89	[illegible]	162[illegible] Vireo AVE	✓
11-1-89	Bill Hoff	1621 VIReo AVe	✓
11-1-89	Joyce Hoff	1621 Vireo ave	✓
11-1-89	Nina Bracht	1605 Vireo ave	✓
11-1-87	Paul Stephens	1119 LORNE WAY	✓
11-1-89	Bob Huddleston	1665 VIREO AVE	✓

11/8 RRT
SNW
RRS
JAM
BHG
RRE

Jim Stallman
1014 Inverness Way
Sunnyvale, CA 94087

0770 '89 NOV -8 P3:07

6NOV89

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Submission of Input regarding the Calabazas Creek Flood Ctrl. Proj.

$8,000,000 is a lot of bucks to spend on a creek that spills over a few streets (whose culverts weren't originally made big enough) when we get (2) weeks of solid rainfall! This is reported to be this project's cost for a 2 mile section running through my neighborhood and up to Miller in Cupertino. I maintain that enlarging the culverts (at the street crossings) and sensible use of the remaining orchard land at this location is the only justified strategy. Voters apparently have already endowed the district with the 8 million dollars and what we have is money in search of a project. I don't know that the voters realize the money is being spent at a 'density' equivalent to lining the banks of the creek from Lawrence to Miller with 5 dollar bills.

I care to state early in the letter here that the district funds should be directed more towards maintenance instead of being gobbled up by local 'Army Corp of Engineers' type 'solutions' to 'artificial' 'problems'. The additional full time positions that could be funded with even part of the $8,000,000 in an annuity represent decent jobs with the dignity and self worth that goes along with it. I don't know if it would reduce the panhandling I encounter by able bodied individuals while waiting for the #22 on El Camino but that is supposed to be the idea. The 'problem' is flooding from a '100 year flood' meeting FEMA criteria. No actual losses to the county treasury have occurred even though we experienced a real '100 year flood' in '81 when the tropical disturbance Emma generated a 3000 mile storm bank that made its way through the South Bay for (2) solid weeks that I mentioned above.

The project has quite a number of good features designed into it - if it is necessary at all. If I remember correctly the last proposal didn't include any culvert enlargement at all and the public was concerned about that. It is surprising to learn that during the recent review time frame where the project was being changed the district has not kept informed on changes to the creek drainage demands represented by route 85 work planned in Cupertino nor the possible conversion of orchard land use along the project section of the creek. Utilization of the orchards to mitigate flooding would be money well spent. No mention of using orchard land for runoff collection or recharging is in the project alternatives. I am concerned that a system that has the beneficiary (Water District Channelization Interests) develop the project plans insures that just certain options will be considered. It is like having the highway department develop plans to improve transportation - you'll only get highway proposals.

The annual report for the Santa Clara Valley Water District, 1988, on page 1 shows a creek in its natural state. I'm not suggesting that the stretch of Calabazas affected by the project should or could be restored to a condition like that in the picture but I will say I was shocked to see Saratoga Creek all fitted out with geometricly aligned gabions where it flows through Santa Clara Central Park. There has got to be a happy median if we are going to submit to regulations run rampant that exist in the government of today. Certainly, what the Water District has come up with for Calabazas is an order of magnitude better than the concrete lined gutters from past projects. If we want our society to someday live with the environment instead of fighting it (and each other) then environmentally sound approaches are needed.

s/

(408) 732-9910

NON AGENDA MATERIA

RAYME (R.M.P.Hayes)
1614 Benton Court
Sunnyvale, California

11/9 SAP(BD)

RECEIVED
NOV - 9 1989

Submitted to the Board of Directors
on the issue of The Calabazas Creek
of California.

CALIFORNIA CREEKS

(a Conservation Plea)

Only the earth reigns with mountains and trees;
Streams that collect freely into the seas;
Clusters of colored flowers fill meadows' glen
And places reserved for wild creatures, not men.

Yet our will insatiably plunders earth's flesh;
Warping its channels with tons of mock mesh;
Killing inhabitants of sacred creeks;
Pouring cement like lunatic freaks.

As we choke knowingly creatures in there
Filling it up with our polished hardware,
We're destroying ourselves, just as surely as sheep,
And deprive future children of beauty to keep.

Wake up California, dear neighbors and friends;
We must strive to help nature's endowments ascend;
Instead of complaints from a gutless, tweet fife
Let's preserve creeks resources and fortify life.

The waters that flow through creeks nourish us, all
Each won'drous thing, full of life, great or small.
Let your incentives protect, not enslave;
Save vital ground, please don't build a stone grave.

Look for the light in your hearts that speak true,
Like the strong roots of trees that draw rain for us too;
Like the chorus of frogs on a balmy sweet night,
Where a multitude of birds and squirrels delight.

The earth was not made for convenience of fools;
Its incredible riches needs stewards and tools;
That means each and everyone breathing with joy;
Every sane adult caring, every girl, every boy.

Save the creeks, tend its future, don't mutilate more
By heaping a pile of cement's lifeless store;
For beneath life is striving and yearning to grow;
Should we humans pronounce, 'Suffocate down below'.

(Turn please)

SUNNYVALE PUBLIC LIBRARY
REFERENCE

LETTERS OF COMMENT

ON

CORPS OF ENGINEERS

PUBLIC NOTICE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
300 South Ferry Street
Terminal Island, California 90731

8/24 RRT
SNW
SMW
RRE
JAM
BHG

August 21, 1990 F/SWR13:MGT

3021 '90 AUG 24 A10:43

Colonel Stanley G. Phernambucq
District Engineer
San Francisco District
Corps of Engineers
211 Main Street
San Francisco, California 94105

Dear Colonel Phernambucq:

We reviewed Public Notice (PN) Number 16833S92 describing a proposal by the Santa Clara Valley Water District to construct flood protection on Calabazas Creek. This project consists of raising existing levees, installing gabion slopes, constructing bypass channels, and maintenance roads, and placing concrete linings in the creek. The PN indicated that this project would result in the loss of 4.05 acres of emergent wetland, 0.60 acres of tidal salt marsh, 5.62 acres of riparian shrub forest, and 1.51 acres of tidal mudflats for a total impact of 11.78 acres of wetlands habitat.

The National Marine Fisheries Service is responsible for preserving and enhancing marine, estuarine, and anadromous fish resources and the habitats that support these resources. Although this stream does not currently support steelhead it is a potentially restorable stream. This project could significantly reduce that potential for restorability. Also, wetlands in and around San Francisco Bay contribute to the health of the bay and the marine environment, and their losses need to be minimized and fully mitigated. We, therefore, oppose the issuance of a permit for this project.

It is the policy of the National Marine Fisheries Service to recommend denial of permits that result in a net loss of wetlands habitat. The applicant discusses a "conceptual" mitigation plan in the public notice. The applicant should develop a comprehensive mitigation plan that will fully offset any loss of habitat. The applicant should also look at ways of reducing impacts by avoidance, such as moving the maintenance roads to the levee caps.

If you have questions concerning these comments or wish to discuss the project further, please contact Michael Thabault of my staff at: National Marine Fisheries Service, 777 Sonoma Avenue, Room 325, Santa Rosa, California 95404; telephone (707) 578-7513.

Sincerely,

E. C. Fullerton
Regional Director

cc: EPA, P. Oshida
CDFG, D. Lollock
FWS, J. McKevitt
Sierra Club - San Francisco Chapter
Applicant

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, California 95825-1846

In Reply Refer To:
PN 16833S92

8/27 REE
SMW
SNW
RRT
BHG
JAM

August 24, 1990

RECEIVED
AUG 27 1990

District Engineer
Regulatory Branch (Attn: Frank Kelleher)
U.S. Army Corps of Engineers
211 Main Street
San Francisco, California 94105

Subject: Public Notice No. 16833S92, Flood Protection on Calabazas Creek; Santa Clara Valley Water District, Santa Clara County, California

Dear Sir:

The Fish and Wildlife Service has reviewed the Public Notice, dated July 26, 1990, describing the proposal to construct flood control measures to provide one percent flood protection on eight miles of Calabazas Creek. We also briefly reviewed the Calabazas Creek Draft Environmental Impact Report (September 1989) that the applicant supplied. These comments have been prepared under the authority of and in accordance with provisions of the Fish and Wildlife Coordination Act and the Clean Water Act.

The applicant proposes to do a variety of flood control construction activities (as described in the Notice). The proposed work would be done in phases and would involve excavating approximately 90,000 cubic yards of soils and sediments, while approximately 85,000 cubic yards of earth fill, and approximately 13,500 cubic yards of gabions will be placed in the creek for erosion protection. In addition, approximately 6,500 cubic yards of concrete material would be placed within the channel in conjunction with bridge modifications and channel transitions. The total fill would be approximately 13.85 acres. Calabazas Creek, within the project boundaries, includes tidal mudflats, tidal salt marsh, emergent wetland, riparian shrub/forest and channel bottom.

The applicant proposes to mitigate for a) the loss of approximately 1.5 acres of mudflat with 1.17 acres of mudflat, b) the loss of approximately 0.60 acres of tidal salt marsh with 0.587 acres of tidal salt marsh, c) the loss of approximately 4.05 acres of emergent wetland with 5.51 acres of emergent wetland, and d) the loss of approximately 5.62 acres of riparian habitat with 8.41 acres of riparian habitat.

The Service is concerned about the continued and cumulative impacts to wetlands within the San Francisco Bay Area. Because of the value to fish and wildlife and the serious degradation and increasing scarcity of wetland habitats, impacts to wetlands should be avoided whenever possible. Our mitigation goal for unavoidable impacts is that there be no net loss of in-kind habitat value or acres. The proposed project would lead to significant adverse impacts to fish and wildlife and their habitats. Although the applicant is offering mitigation, it is only conceptual at this stage, making it difficult to evaluate its effectiveness in compensating for unavoidable resource losses. Because we only received the Calabazas Creek EIR one week prior to preparing these comments, we were unable to do an indepth review. Therefore, we are unable to determine if the proposed project is the least damaging alternative. It is possible that potential resource impacts can be reduced. Furthermore, given the limited success of the mitigation for the Llagas Creek flood control project, (i.e., success criteria not met and replanting not completed), which was sponsored by the applicant (Permit No. 15910S92), the probability of success of mitigation for this project is not high.

Because it is not clear to us that the proposed project is the least environmentally damaging alternative or that the proposed conceptual mitigation would fully compensate for any unavoidable habitat value losses, we recommend that no permit be issued for the proposed project.

If you have any questions about these comments, please contact Marilynn Friley at (916) 978-4613.

Sincerely,

James W. Carson

for Wayne S. White
Field Supervisor
U.S. Department of the
Interior Coordinator

cc: Reg. Dir., (AFWE), FWS, Portland, OR
Dir., CDFG, Sacramento, CA
Reg. Mgr., CDFG, Region III, Yountville
EPA, San Francisco
NMFS, Santa Rosa
RWQCB, Oakland
Save San Francisco Bay Association, Berkeley
Sierra Club, LDF, San Francisco
Applicant

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
1235 Mission Street
San Francisco, CA 94103

8/31 RRE
SMW
SNW
RRT
JAM
BHG

AUG 28 1990

AUG [illegible] 1990

Colonel Stanley G. Phernambucq
District Engineer
U.S. Army Corps of Engineers
San Francisco District
ATTN: Regulatory Functions (Frank Kelleher)
211 Main Street
San Francisco, CA 94105

Subject: Public Notice (PN) No. 16833S92 (July 26, 1990)
Santa Clara Valley Water District, Calabazas Creek,
Santa Clara County, CA

Dear Colonel Phernambucq:

This letter responds to the subject public notice regarding a permit application for the discharge of dredged or fill material into waters of the United States, under Section 404 of the Clean Water Act (CWA). The Environmental Protection Agency (EPA) has reviewed the proposed activities for compliance with the requirements of Federal Guidelines (40 CFR 230), promulgated pursuant to Section 404(b)(1) of the CWA.

The applicant is proposing to discharge approximately 85,000 cubic yards of earth fill rock riprap to construct a flood control project along Calabazas Creek. We believe that the proposed project may contribute to degradation of waters of the United States. According to the public notice, the project has the potential to adversely affect approximately 12 acres of wetland and mudflat habitat, as well as alter stream hydrology (i.e., erosion and sedimentation rates), water quality (i.e., suspended sediment), and instream physical habitat for aquatic organisms.

The following comments address our specific concerns.

1. Alternatives. EPA understands the need for effective flood and erosion control to protect existing structures. However, EPA cannot support projects that have the potential to result in adverse impacts to the aquatic ecosystem in the absence of an analysis of the availability of less environmentally-damaging alternatives. The 404(b)(1) Guidelines require that the selected alternative be the least damaging practicable alternative to achieve the project purpose [40 CFR 230.10(a)]. We are unable to determine whether potential project impacts to the aquatic environment can be practicably reduced or avoided by

employing alternative methods of bank stabilization and/or relocating, redesigning, or downscaling either all or portions of the proposed project.

2. Significant Degradation. EPA is concerned with the cumulative effects of the proposed project on the aquatic ecosystem when considered with past flood control activities in South Bay streams. The subject public notice contains no information on the magnitude of potential project-related impacts to downstream hydrology and water quality. The Guidelines prohibit the discharge of dredged or fill material if it will cause or contribute to significant degradation of the waters of the United States [40 CFR 230.10(c)].

3. Mitigation. We are not aware of any site specific mitigation measures or plans to offset unavoidable project-related impacts to the aquatic environment. The Guidelines require a finding of noncompliance if the proposed discharge does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem [40 CFR 230.10(a)(3)(iii)].

4. Insufficient Information. The lack of quantification of individual and cumulative impacts is also a serious deficiency. The 404(b)(1) Guidelines [40 CFR 230.12(a)(3)(iv)] prohibit the discharge of dredged or fill material if there does not exist sufficient information to make a reasonable judgment as to whether the proposed discharge will comply with the Guidelines.

As presented in the public notice, the proposed project does not appear to comply with the 404(b)(1) Guidelines and we recommend that the application for a permit be denied. My staff is available to meet with your staff and the applicant to further discuss our concerns. Should you have questions regarding our comments, please contact Robert Leidy of my staff at (415) 705-2186, FTS 465-2186.

Sincerely,

Keith Taka —

for Harry Seraydarian, Director
Water Management Division

cc: USFWS, Sacramento, CA
NMFS, Santa Rosa
CDFG, Sacramento
RWQCB, Oakland
Applicant

BOARD OF DIRECTORS AGENDA ITEMS
REGARDING
ENVIRONMENTAL IMPACT REPORT AND ENGINEERS REPORT

R7066s

AGENDA MEMORANDUM

AGENDA DATE 9/19/89 ITEM NO. 4 UNIT Flood Control

ZONE NC PROJECT NO. 2010 NAME Calabazas Creek Planning Study - Guadalupe Slough to Miller Avenue (Sunnyvale, Cupertino, Santa Clara)

SUBJECT: Planning Study Consisting of Engineer's Report and Draft Environmental Impact Report; Authorize Notice of Completion of Draft Environmental Impact Report and Circulation for Public Review; Adopt Resolution Setting Time and Place of Public Hearing on Draft Environmental Impact Report.

EXPLANATION:

The attached Engineer's Report proposes measures to protect 2000 homes and businesses from flooding on Calabazas Creek between Guadalupe Slough and Miller Avenue. Damages to these structures from the one percent flood are estimated to exceed $35 million. Calabazas Creek is the highest priority project in the North Central Zone.

During the course of the planning study District staff met with various homeowners, residents, business owners and public agencies. A public meeting was held in May, 1986 for the residents in the reaches upstream of Lawrence Expressway. The plan was presented to federal and state regulatory agency representatives in March, 1987. Map review sessions were held in August, 1987 and December, 1988 to give the public an opportunity to review and comment on the plans.

Several alternative solutions to the flooding, erosion and sedimentation problems were investigated including upstream reservoirs, floodplain acquisition, various types of channel modification, bypass channels and flood basins.

The proposed project was selected because it provides one percent flood protection while minimizing construction and maintenance costs and overall impact to the community and environment. The project is a combination of channel and levee modification, gabion lining, bridge replacement, and a short high-flow bypass channel.

The proposed project is estimated to cost $13.9 million. The project construction will be staged over several years as revenue is available in the North Central Flood Control Zone. Construction could be completed in eight years assuming the present benefit assessment program continues beyond its 1991 expiration date. Without the continuation of benefit assessment construction would take eleven years.

The Draft EIR (which is bound with the Engineer's Report), finds that the proposed project will have a significant impact on the existing biological and visual resources of the creek. A revegetation program is planned to replace lost wildlife and aesthetic values by restoring much of the riparian habitat. Approximately 3000 trees and shrubs would be planted over eight acres. Floodwalls will be architectually treated to mitigate aesthetic impacts. The importance of this project is such that a public hearing on the Draft EIR appears to be indicated.

RECOMMENDATION: That the Board authorize filing of Notice of Completion of the Draft Environmental Impact Report, authorize circulation of the Draft Environmental Impact Report for a period of 52 days; and adopt the Resolution scheduling a public hearing on the Draft Environmental Impact Report.

APPROVED

SEP 12 1989

RESOLUTION NO.89-84

CALLING A PUBLIC HEARING ON DRAFT ENVIRONMENTAL IMPACT REPORT AND PROVIDING FOR NOTICE THEREOF

BE IT RESOLVED, by the Board of Directors of Santa Clara Valley Water District as follows:

FIRST: This Board finds it desirable to conduct a public hearing on the environmental impact of a proposed project, to wit: Proposed Flood Control Plan for Calabazas Creek.

SECOND: The public hearing shall be held at the time and place provided in the Notice thereof hereinafter set forth; provided, that the same shall in no event be conducted sooner than fourteen (14) days after the filing and posting of the notice of completion of the draft Environmental Impact Report upon said proposed project.

THIRD: The attached Notice shall be published once in the SAN JOSE MERCURY NEWS, a newspaper of general circulation within the District, said publication to be done at least fourteen (14) days prior to the date set for public hearing.

PASSED AND ADOPTED by the Board of Directors of Santa Clara Valley Water District on September 19, 1989 by the following vote:

AYES: Directors L. DONOHUE ~~P. T. FERRARO R. W. GROSS~~ J. JUDGE
~~J. J. LENIHAN~~ J. PANDIT S. SANCHEZ

NOES: Directors None

ABSENT: Directors P.T.Ferraro, R.W.Gross, J.J.Lenihan

SANTA CLARA VALLEY WATER DISTRICT

By: ______________________
Chairman of the Board of Directors

ATTEST: SUSAN A. PINO

____
Clerk of the Board of Directors

NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that the Board of Directors of Santa Clara Valley Water District will conduct a PUBLIC HEARING on the environmental impact of a proposed District project known as PROPOSED FLOOD CONTROL PLAN FOR CALABAZAS CREEK on the 25th day of October 1989 at the hour of 7:30 p.m. in the Multipurpose Room at Wilcox High School, 3250 Monroe Street, Santa Clara, California.

The draft Environmental Impact Report on said project is available for review at the District office at 5750 Almaden Expressway, San Jose, California, and at

City Hall
City of Santa Clara
1500 Warburton Avenue
Santa Clara, CA 95050

City of Santa Clara
Central Library
2635 Homestead Road
Santa Clara, CA 95050

City Hall
City of Cupertino
10300 Torre Avenue
Cupertino, CA 95014

Cupertino Library
10400 Torre Avenue
Cupertino, CA 95014

City Hall
City of Sunnyvale
456 W. Olive Avenue
Sunnyvale, CA 94086

Mission College Library
3000 Mission College Boulevard
Santa Clara, CA

Said draft Environmental Impact Report will be used as the basis for discussion at said hearing.

Comments on the draft Environmental Impact Report which will be specifically treated in the final Environmental Impact Report MUST BE IN WRITING and must be received at the District office before the close of business on November 10, 1989.

All persons in any way interested in or affected by said proposed project are invited to be present and to participate in the hearing process.

DATED: Sept 19, 1989

Susan A. Pino
Clerk of the Board of Directors

CONFORMED COPY

FC 1025 (01-13-92)

AGENDA MEMORANDUM

AGENDA DATE 4/28/92 4/21/92 ITEM NO. 6 DEPARTMENT Flood Control Planning

ZONE NC PROJECT NO. 2010 NAME Calabazas Creek Planning Study (Guadalupe Slough to Miller Avenue)

SUBJECT: Engineer's Report and Final Environmental Impact Report on Proposed Flood Control Improvements on Calabazas Creek from Guadalupe Slough to Miller Avenue

i) Resolution Specifying Intention to Undertake Work of Improvement and Providing for Notice of Public Hearing on Engineer's Report (Santa Clara-Sunnyvale-Cupertino)

RECOMMENDATION:

That the Board adopt the Resolution of Intent to Undertake a Work of Improvement and Providing Notice of Time and Place of Public Hearing on the Project Engineer's Report.

BACKGROUND/SUMMARY:

The Project

The Engineer's Report proposes construction of measures to protect 2,000 homes and 75 industrial and commercial buildings from floodwaters leaving Calabazas Creek between Guadalupe Slough and Miller Avenue, a distance of 7 miles. It is estimated that damages from a single 1 percent flood would exceed $35 million.

The proposed project includes acquisition of approximately 4 acres of right of way at an estimated cost of $1.2 million. Acquisition would be needed at locations along the creek where the District has insufficient right of way (or no right of way). Lands to be acquired are presently utilized as orchards.

A proposed plan for flood, erosion, and sediment control as well as future maintenance is presented in this Engineer's Report. This proposed plan includes levee raising, concrete floodwall construction, partial channel excavation and gabion slope protection, culvert modifications, bridge floodproofing, and bridge construction. The estimated cost of construction is $12.5 million.

Environmental Impact Mitigation

The final Environmental Impact Report (EIR), which is bound with the Engineer's Report, finds that the project will have significant impact on the environment. The project will remove about 6 acres of riparian habitat including 49 percent of the existing trees within the riparian corridor in the upstream reaches and 1.7 acres of wetland in the lower reaches. These losses will have adverse effects on wildlife and scenic values along Calabazas Creek. The mitigation plan will create 1.7 acres of new wetlands. A revegetation plan for 8.3 acres is proposed to replace lost riparian habitat, and aesthetic value with native vegetation compatible with the creek environment and beneficial to human and wildlife vitality. Total costs of the mitigation plantings for this project are estimated to be $0.6 million.

(Continued from April 21, 1992)

APPROVED

APR 28 1992

The draft EIR was circulated for 53 days and a public hearing was held on October 25, 1989 in Santa Clara. During the review period, written comments were received from the California Department of Fish and Game, the City of Cupertino, the City of Santa Clara, the City of Sunnyvale, one business, and four private citizens. In addition, a petition was received from residents near Reach 2 which expressed environmental concerns. A number of the comments received were generally supportive of the project.

Written comments received and responses thereto are contained in Appendix W of the Engineer's Report/Environmental Impact Report. The final reports have been revised to address these comments.

The Corps of Engineers 404 permit and the Department of Fish and Game Memorandum of Understanding are in the final stages of negotiation. This is the reason for the lengthy delay since the public hearing on the EIR. Staff presented a status report to the Board on November 19, 1991.

The attached resolution calls a public hearing on the Engineer's Report to be held on May 26, 1992, in the Board Room at 9:30 a.m., prior to which the Board will be asked to certify the final EIR on the project.

FINANCIAL IMPACT:

The estimated total cost of the project is $16.5 million and would be funded by existing revenue sources in the North Central Zone. If so authorized, project construction can begin this summer and continue in several stages until completed in about 1995.

RESOLUTION NO. 92-28

SPECIFYING INTENTION TO UNDERTAKE WORK OF IMPROVEMENT WITHIN THE NORTH CENTRAL ZONE OF SANTA CLARA VALLEY WATER DISTRICT AND PROVIDING FOR NOTICE OF TIME AND PLACE OF PUBLIC HEARING THEREON

WHEREAS, the North Central Zone of Santa Clara Valley Water District has been duly and regularly established and exists pursuant to the provisions of the Santa Clara Valley Water District Act; and

WHEREAS, on the 28th day of April 1992, the report of the District's Engineer was duly filed with this Board containing information in regard to a work of improvement ("project") for Calabazas Creek in said Zone showing:

1. A general description of the project together with general plans and profiles relating thereto;
2. A general description of and maps showing the location of the proposed project and the lands, rights of way, and easements required therefor; and
3. An estimate of the cost of the proposed project, and means of financing these costs;

NOW, THEREFORE, be it resolved by the Board of Directors of Santa Clara Valley Water District as follows:

Section 1. Subject, nevertheless, to a determination whether to proceed with the project following the public hearing thereon hereinafter provided for; it is hereby found and determined:

(a) That the public interest and convenience require and it is the intention of this Board to undertake said project within said Zone in accordance with the Engineer's Report heretofore filed on the 28th day of April 1992 with this Board, to which said report, together with the maps showing the general location and general construction of the said project in said report contained, reference is hereby made for further particulars;

(b) That this Board does hereby find and determine that the said proposed work is for the benefit of said Zone and this Board further determines and declares that the cost and expense of said work shall be chargeable and charged upon property within said Zone;

Section 2. That the Engineer of this District has estimated the approximate cost of the construction of said project for the said Zone to be $16,563,384 which costs shall be borne by the property within said Zone as aforesaid;

Section 3. That the aforesaid Engineer's Report, containing maps and general construction plans of the said Zone, showing the general location and general construction of said project, have been prepared by said District Engineer for public inspection by any interested person and may be seen at the

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

City Hall
City of Sunnyvale
456 West Olive Avenue
Sunnyvale, CA 94086

City Hall
City of Santa Clara
1500 Warburton Avenue
Santa Clara, CA 95050

City Hall
City of Cupertino
10300 Torre Avenue
Cupertino, CA 95014

which are hereby designated as the public places where a copy of said maps, showing the location, and general construction plans of said project may be viewed; that such maps and plans shall be posted at said public places for at least two weeks prior to the public hearing hereby fixed;

Section 4. That the 26th day of May 1992 at the hour of 9:30 a.m. in the Santa Clara Valley Water District Board Room, 5750 Almaden Expressway, San Jose, California, be and the same are hereby fixed as the time and the place where this Board will consider all written and oral objections to the proposed project;

Section 5. That the Clerk of this Board be and she is hereby directed to cause the attached notice to be given of said public hearing by the publication of a notice thereof once a week for two consecutive weeks prior to the date fixed for said public hearing, the last publication of which notice shall be at least seven days before said hearing, in the San Jose Mercury, a newspaper of general circulation circulated in said Zone, and hereby designated by this Board to be the newspaper most likely to give notice of said public hearing to the residents and property owners in said Zone; said notice shall be in words and figures as follows, to wit:

NOTICE OF TIME AND PLACE OF PUBLIC HEARING ON PROPOSED WORK OF IMPROVEMENT AND COSTS THEREOF WITHIN THE NORTH CENTRAL ZONE OF SANTA CLARA VALLEY WATER DISTRICT

NOTICE IS HEREBY GIVEN that the 26th day of May 1992 at the hour of 9:30 a.m. in the Santa Clara Valley Water District Board Room, 5750 Almaden Expressway, San Jose, California is the time when and the place where a public hearing will be held on the Resolution of the Board of Directors of the Santa Clara Valley Water District specifying intention to undertake a work of improvement ("project") within and for the benefit of the North Central Zone of the Santa Clara Valley Water District;

That plans for the construction of said project are contained in an Engineer's Report of proposed improvements for the said Zone entitled "Calabazas Creek Planning Study (Guadalupe Slough to Miller Avenue) consisting of the Engineer's Report and Final Environmental Impact Report", which said Report also contains maps of the Zone showing the general location and general construction of said project and is on file in the office of the Clerk of the Board of Directors, 5750 Almaden Expressway, San Jose, California, and may also be seen by any interested person at

City Hall
City of Sunnyvale
456 West Olive Avenue
Sunnyvale, CA 94086

City Hall
City of Santa Clara
1500 Warburton Avenue
Santa Clara, CA 95050

City Hall
City of Cupertino
10300 Torre Avenue
Cupertino, CA 95014

that the cost of the work to be borne by said Zone, according to engineering estimates is $16,563,384.

That at the time and place fixed for said hearing, or at any time to which said hearing may be continued, said Board will consider all written and oral objections to the proposed project; that upon the conclusion of the hearing the Board may abandon the proposed project or proceed with the same unless prior to the conclusion of said hearing written protests against the proposed project signed by a majority in number of the registered voters resident within said Zone be filed with the Board, in which event further proceedings relating to such project shall be suspended for not less than 6 months following the date of the conclusion of said hearing, or said proceedings may be abandoned in the direction of the Board;

That any registered voter residing within the District may file a written protest against the proposed project at said hearing prior to its conclusion, or such protest may be filed prior to the time of such hearing in the office of the Clerk of said District Board, 5750 Almaden Expressway, San Jose, California.

Dated:

Susan A. Pino
Clerk/Board of Directors

PASSED AND ADOPTED by the Board of Directors of Santa Clara Valley Water District on April 28, 1992 by the following vote:

AYES: Directors ~~J. DONOHUE~~ P. T. FERRARO ~~R. W. GROSS~~ J. JUDGE
J. J. LENIHAN J. PANDIT S. SANCHEZ

NOES: Directors J. DONOHUE R. W. GROSS

ABSENT: Directors NONE

SANTA CLARA VALLEY WATER DISTRICT

By:
Chairman/Board of Directors

ATTEST: SUSAN A. PINO

Susan A. Pino
Clerk/Board of Directors

CONFORMED COPY

FC 1025 (01-13-9

AGENDA MEMORANDUM

AGENDA DATE 5/26/92 ITEM NO. 3d DEPARTMENT Flood Control Planning

ZONE NC PROJECT NO. 2010 NAME Calabazas Creek Planning Study—Guadalupe Slough to Miller Ave. (Cupertino, Santa Clara, and Sunnyval

SUBJECT: Certification of Final Environmental Impact Report and Resolution Approving Report of Engineer and Determining to Proceed with Work of Providing Flood Control Protection Measures on Calabazas Creek

RECOMMENDATION:

That the Board authorize the Chairman to:

a) Certify the Final EIR.
b) Make findings relative to the significant adverse impacts identified in the EIR.
c) Adopt the Resolution.

BACKGROUND/SUMMARY:

On October 25, 1989, the Draft Environmental Impact Report (DEIR) for a flood control project on Calabazas Creek was presented to the public at a hearing in the City of Santa Clara. The DEIR has been revised to respond to all comments which were received during the 53-day public review period.

On April 28, 1992, the Board set 9:30 a.m. on May 26 as the time, and the Board Room as the place, for the public hearing on the Engineer's Report. After considering any comments that may be received at this public hearing, the Board first should determine whether to certify the final EIR and then whether to approve or disapprove the project. An attached draft resolution has been prepared which approves the project and authorizes the District staff to proceed with final design and construction in accordance with the Engineer's Report. The attached Statement of Findings and Mitigation Monitoring Plan identifies and discusses the significant adverse impacts of the project, discusses the mitigation measures and monitoring procedures for these impacts, and makes findings relative to these impacts.

FINANCIAL IMPACT:

The estimated total cost of the project is $16.5 million and would be funded by existing revenue sources in the North Central Zone supplemented by debt financing as required to meet the proposed schedule. If so authorized, project construction can begin this summer (1992) and continue in several stages until completed in about the year 1995.

AUTHORIZED

MAY 2 6 1992

CALABAZAS CREEK FLOOD CONTROL PROJECT

STATEMENT OF FINDINGS
AND
MITIGATION MONITORING PLAN

MAY 1992

SANTA CLARA VALLEY WATER DISTRICT

FINDINGS OF THE BOARD OF DIRECTORS OF THE SANTA CLARA VALLEY WATER DISTRICT REGARDING THE CALABAZAS CREEK FLOOD CONTROL PROJECT

FINDINGS

A. The proposed general construction plans and the mitigation measures presented in the Final Environmental Impact Report (FEIR) and the attached Mitigation Monitoring Plan will reduce significant impacts to insignificant levels.

B. The Mitigation Monitoring Plan is the Plan to be followed to mitigate environmental impacts resulting from construction and maintenance of the Calabazas Creek Flood Control Project.

C. Specific Impacts: The significant impacts resulting from this project include losses of wildlife habitat, aesthetic impacts, archeological impacts, impacts to local drainage, and construction-related impacts (air quality, water quality, noise, hazardous materials, and traffic). The reasons why these impacts will occur are found in the Chapter of the FEIR entitled "Description of the Recommended Project". The following is a discussion of these impacts and the measures which will be used to mitigate these impacts.

1. *Biological Resources*

Losses of 1.7 acres of coastal brackish marsh and 0.06 acres of willow riparian habitats, in Reaches 9-12, and approximately 6 acres of riparian habitat, in Reaches 1-8, cannot be avoided but the impact of these losses will be substantially lessened and mitigated. No significant unmitigated loss of wetland or riparian habitat will occur because replacement areas will be established and preserved.

To compensate for the losses to wetlands, a 1.7 acre wetland area will be created downstream of Highway 237 (Reach 9). An existing levee will be graded to provide a 30-foot wide planting bench area at an elevation subject to tidal influence. This bench will then be revegetated with marsh plants which support wildlife.

To compensate for the loss of riparian habitat, 8.3 acres of trees and shrubs will be established between Lawrence Expressway and Miller Avenue (Reaches 1-8). Approximately 4,500 plants will be installed on 8.3

acres. The plants which have been selected are native species associated or compatible with riparian ecosystems. A complete listing is provided in Appendix S-II of the FEIR. All plantings will be irrigated until they are established.

Temporary significant impacts on resident and transient wildlife will be caused by partial elimination of riparian communities in Reaches 1-12. Partial elimination of riparian habitat will result from project construction and proposed maintenance activities. Wildlife which is dependent on the riparian habitat will be reduced in number and diversity but probably will not be eliminated. Most of the existing animal population is expected to become reestablished as has occurred in the past.

In order to minimize impacts to wildlife, clearing of vegetation and initial construction activities will not begin until after July 1, when most species have completed the breeding season. In order to avoid impacts to burrowing owls, a survey for burrowing owls will be conducted by District staff before construction begins in Reaches 9-12. If burrowing owls are found, a detailed plan for their relocation will be developed. The relocation site, the location methodology, and a monitoring program will be determined with assistance from the California Department of Fish and Game.

Downstream of Tasman Drive, the post-project maintenance program will be less intense than the current maintenance program. Sediment benches supporting emergent wetland vegetation are expected to form in some of these areas. Because the sediments would be removed less frequently, the average fish habitat area would be reduced but upland habitat will be increased.

The maintenance program has been developed to be compatible with the goals of the revegetation program. Reaches with habitat potential have been designed to ultimately accommodate a greater amount of vegetation within the right of way than now exists without compromising flood protection. If dredging becomes necessary in Reach 11, a secondary channel with a center island will be established to provide for additional fish habitat.

The application of the mitigation measures presented herein, in the FEIR and in the Mitigation Monitoring Plan will reduce impacts to wetland and riparian habitat caused by both construction and maintenance below a level of significance.

2. *Aesthetics*

Aesthetic impacts will result from the construction of concrete floodwalls and access ramps, straightening the creek, lining the banks with gabions, initial removal of vegetation within the channel and periodic removal of vegetation to maintain hydraulic capacity.

In order to minimize and reduce the aesthetic impacts, the artificial appearance of the uniform gabion lining will be softened and screened with plantings, and the appearance of concrete structures such as floodwalls and maintenance ramps will be softened by architectural treatment.

As part of the planting program, larger sized containers of trees and shrubs will be planted in the vicinity of bridges crossing gabion lined channels in order to provide more rapid visual screening. The mattress gabions and the shelf area of the stepped gabions will be covered with soil to mitigate the structural appearance of the modified channel. The soil cover will also encourage natural revegetation with grasses and weedy species. The revegetation program will eventually result in mature vegetation which will soften and screen the artificial appearance of both the stepped gabions and the uniform side slopes of the modified channels.

Where floodwalls will be visible to traffic or extend above residential fencing, they will be architecturally treated to soften their visual impact. Maintenance ramps will also be architecturally treated. The architectural treatments could involve the use of color tints and textured concrete.

The application of the mitigation measures presented herein, in the FEIR and in the Mitigation Monitoring Plan will reduce all aesthetic impacts below a level of significance.

3. *Archeological Resources*

Two possibly significant archeological sites have been identified adjacent to the project area. The archeological investigations are contained in Appendices Q and R of the FEIR. Impacts to these sites will be minimized through monitoring by a qualified archeologist of ground-disturbing construction activities. In the event cultural materials are exposed, the archeologist will examine them and make appropriate recommendations.

The application of the mitigation measures presented herein, in the FEIR, and in the Mitigation Monitoring Plan will assure that impacts to archeological resources remain below a level of significance.

4. *Local Drainage*

The proposed project will result in a potentially significant impact to local drainage. Between Guadalupe Slough and about 1,500 feet upstream of Highway 101, water levels during floods will be slightly higher with the proposed project than without the project. Increased water elevation in the creek would slightly increase the frequency of ponding in the streets in those areas without storm water pumping stations. In order to prevent reverse flow, flap gates will be provided at storm drain outlets.

The application of the mitigation measures presented herein, in the FEIR, and in the Mitigation Monitoring Plan will assure that impacts to local drainage remain below a level of significance.

5. *Construction (air quality, water quality, noise, hazardous materials, and traffic)*

The following construction-related impacts, taken together, will result in a significant impact. Construction activity will increase dust and exhaust emissions locally, probably exceeding air quality standards intermittently. Graded soil surfaces will be subject to increased wind and water erosion from the time of initial grading until establishment of permanent vegetative ground cover or stabilization of the soil. Daytime construction noise and ground shaking is expected to disturb residents and wildlife adjacent to the creek. There is a possibility of encountering contaminated groundwater or soils during construction. Known contamination sites are listed in Appendix U of the FEIR. All roads will remain open to traffic. However, in some areas adjacent to construction sites, traffic may be delayed or detoured as a safety measure.

In order to minimize the impact of construction activities on air quality and noise levels, contractors will be required by the construction specifications to follow applicable federal, state, and local guidelines, laws, and regulations. In order to minimize erosion from water flowing in the channel, construction will be scheduled to complete creek section modifications before heavy winter rains begin. In order to minimize the effect of construction on any existing groundwater or soil contamination and to assure compliance with all State and Federal laws, a management plan has been developed and is contained in Appendix U of the FEIR. In order to minimize impacts to traffic, the District will develop traffic control plans together with each appropriate city during project design.

The application of the mitigation measures presented herein, in the FEIR, and in the Mitigation Monitoring Plan will reduce all construction-related impacts below a level of significance.

MITIGATION MONITORING PLAN
CALABAZAS CREEK FLOOD CONTROL PROJECT

INTRODUCTION

The Final Environmental Impact Report (FEIR) prepared by the Santa Clara Valley Water District for the Calabazas Creek Flood Control Project provides an analysis of the environmental, engineering, and maintenance considerations for the proposed project. The FEIR also describes and discusses various other alternatives which were investigated, including the no-project alternative. In compliance with the California Environmental Quality Act (CEQA), thorough studies were conducted to determine potentially significant environmental impacts and identify appropriate mitigation measures.

The Mitigation Monitoring Plan has been prepared in compliance with the requirements established in CEQA and Assembly Bill (AB) 3180. CEQA provides that when making findings, a public agency must adopt a monitoring plan for the proposed project in order to mitigate or avoid significant effects on the environment. The primary goal of this plan is to assure that the construction and maintenance of the Calabazas Creek Flood Control Project will avoid or reduce potentially significant impacts to the greatest extent feasible.

The following provides details of the program for monitoring of mitigation measures. A monitoring checklist is contained in Appendix S-VII of the FEIR. This list includes the reviewing parties responsible for monitoring compliance for each mitigation measure.

BIOLOGICAL RESOURCES

In order to monitor mitigation of impacts to wetlands and to riparian habitat, detailed revegetation plans and specifications (i.e. contract documents) consistent with the mitigation and monitoring plan (contained in Appendices S-I and S-II of the FEIR) will be prepared by the District. These documents and a final monitoring plan will be submitted to the California Department of Fish and Game (CDFG) and the Army Corp of Engineers (COE) for approval. Following implementation, monitoring of replacement wetlands will be conducted for at least 5 years after installation to assure that performance standards for the revegetation program have been met. Annual monitoring reports will be prepared and corrective measures will be evaluated and applied as necessary in order to reach the goals of the revegetation program.

In accordance with the Memorandum of Understanding (MOU) between the CDFG and the District (contained in Appendix S of the FEIR), the District will acquire a 1601 agreement before issuing the notice to proceed for the construction of each reach. In addition, the District will obtain a Section 404 Permit from the COE prior to commencement of construction. The District's construction contract will require that the contractor comply with all requirements and /or conditions stated in the MOU, the 1601 agreement and the 404 permit.

In order to monitor mitigation of impacts to wildlife, detailed construction specifications, which state that construction will not begin until after July 1, will be developed by the District during project design. District inspectors will oversee project implementation to insure conformance by the Contractor to these specifications.

AESTHETICS

In order to monitor mitigation of aesthetic impacts, detailed construction specifications, which specify the use of architectural treatments for concrete, will be developed by the District during project design. District inspectors will oversee project implementation to insure conformance by the Contractor to these specifications.

ARCHEOLOGICAL RESOURCES

In order to monitor mitigation of impacts to archeological impacts, the District will retain a quualified archeologist who will field monitor ground-disturbing construction activities.

LOCAL DRAINAGE

In order to monitor mitigation of local drainage impacts, District inspectors will ensure that flap gates of an approved design are installed to specifications.

CONSTRUCTION (Air Quality, Water Quality, Noise, Hazardous Materials, and Traffic)

In order to monitor mitigation of construction-related impacts, detailed construction specifications which require the Contractor to follow applicable federal, state, and local guidelines, laws, and regulations, will be developed by the District during project design. District inspectors will oversee project implementation to insure conformance by the Contractor to these specifications.

RESOLUTION NO. 92-33

APPROVING GENERAL CONSTRUCTION PLANS IN REPORT OF ENGINEER AND DETERMINING TO PROCEED WITH WORK OF PROVIDING FLOOD PROTECTION MEASURES ON CALABAZAS CREEK FROM GUADALUPE SLOUGH TO MILLER AVENUE

WHEREAS, the North Central Zone of Santa Clara Valley Water District has been duly and regularly established and exists pursuant to the provisions of the Santa Clara Valley Water District Act; and

WHEREAS, on the 21st day of April 1992, the Report of the District Engineer was filed with this Board, which report consisting of maps and general construction plans for Calabazas Creek from Guadalupe Slough to Miller Avenue shows:

1. A general description of the proposed work of flood control protection measures ("project"), together with plans and profiles relating thereto;

2. A general description of and maps showing the location of the proposed project and the lands, rights of way, and easements required therefor; and

3. An estimate of the costs of the proposed project and means of financing these costs; and

WHEREAS, this Board of Directors did on the 28th day of April 1992, adopt its resolution declaring that the public interest and convenience require the construction of said project in accordance with said maps and general construction plans as contained in said report and specifying its intention to undertake construction of the same and setting a time and place for public hearing of said resolution, to wit, the 26th day of May 1992 at 9:30 a.m. in the District Board Room, 5750 Almaden Expressway, City of San Jose, California; and

WHEREAS, notice of the time and place of said public hearing was duly given and published pursuant to law; and

WHEREAS, on said 26th day of May 1992 at the time and place in said resolution and in said notice specified, a public hearing was duly held;

NOW, THEREFORE, be it resolved by the Board of Directors of Santa Clara Valley Water District as follows:

1. That all comments including all written and oral objections to the proposed project have been heard and considered;

2. That this Board hereby finds and determines that the requirements of the California Environmental Quality Act of 1970, as amended, and Guidelines for the implementation thereof have been met and complied with;

3. That this Board hereby approves said Engineer's Report including the general construction plans for Calabazas Creek from Guadalupe Slough to Miller Avenue, Project Number 2010 in said Zone;

4. That this Board hereby determines that said project is for the benefit of a single zone of the District, to wit, North Central Zone, further determines to proceed with the construction of said project in said Zone according to the said report and plans of the Engineer of this District and further determines that the cost thereof shall be borne by said Zone; and

5. That the District Engineer is directed to draw up precise plans and specifications for said project based upon the said report.

PASSED AND ADOPTED by the Board of Directors of the Santa Clara Valley Water District on the 26th day of May 1992 by the following vote:

AYES: Directors J. DONOHUE P. T. FERRARO R. W. GROSS J. JUDGE ~~J. J. LENIHAN~~ J. PANDIT S. SANCHEZ

NOES: Directors NONE

ABSENT: Directors J. J. LENIHAN

SANTA CLARA VALLEY WATER DISTRICT

By: /S/ PAT T. FERRARO
Chairman/Board of Directors

ATTEST: SUSAN A. PINO

/S/ SUSAN A. PINO
Clerk/Board of Directors